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EMPIRICAL ANALYSIS OF THE LABOUR MARKET EARNINGS DETERMINATION PROCESS IN THE EASTERN CARIBBEAN

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Thesis Submitted for the Degree of Doctor of Philosophy

September 2010

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SUMMARY

The study utilizes Labour Force Surveys (LFS) for Barbados, Dominica, and St.Lucia for selected periods within 1996 – 2004 to analyse the themes of private rates of returns to the individual investment in education; and inter-industry wage structure and the sub-themes of public sector pay premium and the gender pay gap. The interval coded nature of the earnings data reported in the LFS, requires the use of an interval regression model estimated by maximum likelihood techniques. A key empirical finding in the study is that the Eastern Caribbean labour market places a relatively high valuation on formally acquired post-primary human capital assets. The industrial wage structure in the selected countries reflects the effects of recent trade policy changes in regard to agriculture. The overall inter-industry wage dispersion was found to be high in Dominica and St.Lucia, remaining relatively constant in the two periods in the latter country. In Barbados the inter-industry wage structure was substantial but unlike the other countries expanded over time. The study finds the *ceteris paribus* public sector pay premium in the recent past has improved for women and is relatively large and suggests public sector workers are securing a high rent through employment in this sector. A gender pay gap in the range of 14 percent – 20 percent is detected and in Dominica there is also evidence of a sizeable ethnic pay disadvantage for male members of the island's indigenous population. In all respects the outcomes for the selected countries follow a clear pattern that mirrors the findings in the empirical literature on the Caribbean.

ACKNOWLEDGEMENTS

I graciously acknowledge the advice and direction of my academic supervisor Dr. Barry Reilly. My sincerest appreciation to the Statistics Departments in the selected Eastern Caribbean Countries, in particular Mr. Edwin St. Catherine, St. Lucia Statistical Office; Mrs. Prayma Carrette, Dominica Central Statistics Office; Mr. Aubrey Browne, Barbados Statistical Services. In addition, I thank Dr. Juliet Melville of the Caribbean Development Bank and Dr. Vanus James for their advice in the early stages of developing the thesis ideas. I thank my family, friends and professional colleagues profoundly for their constant support and encouragement. Finally and most importantly I praise the Almighty for all His blessings and unending favour. The errors and omissions remain the sole responsibility of the author.

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ACRONYMS AND ABBREVIATIONS

ACP	African, Caribbean and Pacific
BD$	Barbados dollars
CARICOM	Caribbean Community
CDB	Caribbean Development Bank
CLFSS	Continuous Labour Force Sample Survey
CSO	Central Statistics Office
EC$	Eastern Caribbean dollar
ECLAC	Economic Commission for Latin America and the Caribbean
EPA	Economic Partnership Agreement
EU	European Union
FATF	Financial Action Task Force
FIML	Full Information Maximum Likelihood
GDP	Gross Domestic Product
HDI	Human Development Index
ILO	International Labour Organisation
IMF	International Monetary Fund
IMR	Inverse Mills Ratio
IRM	Interval Regression Model
ISIC	International Standard Industry Classification
LFS	Labour Force Survey
ML	Maximum Likelihood
NCCTs	Non-cooperative Countries and Territories
OECD	Organisation for Economic Development and Cooperation
OECS	Organisation of Eastern Caribbean States
OLS	Ordinary Least Squares
PPP	Purchasing Power Parity
PRGF	Poverty Reduction Growth Facility
SBA	Stand-by Arrangement
UNDP	United Nations Development Programme
UNESCO	United Nations Educational, Scientific and Cultural Organisation
US$	United States dollar
UWI	University of the West Indies

CHAPTER 1: INTRODUCTION

The countries of the Eastern Caribbean are small in size, population and economic activity. They have open economies and are exposed to external vulnerabilities. The inherent and external challenges confronting Caribbean countries, government policies and household decisions impact the labour market. The analysis of the labour market earnings determination process thus provides an important avenue to understand the processes that govern Caribbean labour markets. This paper investigates a number of labour market themes including the magnitude of the rates of returns to education, the nature of the inter-industry wage structure, public-private sector pay premium and the gender pay gap. The examination of these related themes are important in explaining broader economic and social processes and useful for understanding policy issues in the Caribbean. The analysis is undertaken for the Eastern Caribbean islands of Dominica, St. Lucia and Barbados.

Research Questions

The thesis examines two key research questions. First, what are the rates of return to education qualifications in the selected Eastern Caribbean countries and how have they evolved over a recent period when the region has been undergoing economic restructuring? Second, what is the nature of the inter-industry wage structure at the one-digit industry level in selected Eastern Caribbean countries and how has it changed over a recent period associated with economic restructuring in the region? The thesis also investigates two secondary questions to complement the analysis, as the empirical analysis also allows for the investigation of these questions. Thus, the third question is related to the public sector pay premium and investigates what are the differences in labour market earnings between the public and private sectors in these islands. Fourth, what is the magnitude of the gender pay gap in the selected Eastern Caribbean countries and how has it evolved over a recent period of economic change in the region?

The first empirical question of the current study is to obtain some insight into how the labour market in Dominica, St.Lucia and Barbados values human capital assets, and this is served by estimating returns to formal human capital measures (i.e., formal educational levels) within an earnings regression framework. This allows us to compute the returns for these countries, situate them in both a regional and international context, and assess whether policy with respect to different educational sectors is currently adequate.

The economies of the Eastern Caribbean countries are in the process of restructuring, and an equally important empirical theme relates to establishing the nature of the inter-industry wage structure in the labour market. The analysis on the inter-industry wage structure forms the second research question of the thesis. The empirical approach will provide the basis for determining the magnitude of inter-industry wage dispersion and the relative *ceteris paribus* earnings premia (or otherwise) corresponding to each industrial sector, and, where possible, assess its stability over time.

The third research question of the thesis also utilizes the earnings regression model in the determination of the public sector pay premium. The investigation of the public sector pay premium has some contemporary significance given recent government policies targeted at public sector pay and employment reform in the selected countries. The estimation of an earnings regression model also permits, *inter alia*, an analysis of the gender dimension to earnings and as the fourth research question the gender pay gap is thus examined. The investigation of the public sector pay premium and the gender pay gap are largely conducted as a set of secondary issues as they complement the research on the rates of return and inter-industry wage structure and are relatively easy to estimate in the current estimation framework.

Study Rationale

Aspects of labour market earnings outcomes have been the subject of investigation for parts of the Caribbean region broadly defined. The studies in the literature focusing on labour market issues are Griffith (2001) and Coppin (1996a; 1996b) for Barbados; Terrell (1992) for Haiti; Bedi and Born (1995) and Bedi (1997) for Honduras; Scott

(1992), Hotchkiss and Moore (1996), and Honig (1996) for Jamaica; Horowitz and Schenzler (1999) for Suriname; Coppin and Olsen (1998), Olsen and Coppin (2001), Bourne and Dass (2003), Coppin and Olsen (2007) and Sookram and Watson (2008) for Trinidad and Tobago. However, limited empirical research has been undertaken on this topic for the smaller islands within the Eastern Caribbean. It is not surprising given the size and global insignificance of these countries. However, the absence of such research is not entirely helpful for an understanding of the nature and structure of labour markets in the Eastern Caribbean and hence the putative effects of policy change. The primary purpose of the thesis, therefore, is to rectify this imbalance by investigating the determinants of labour market earnings in Dominica, St. Lucia and Barbados with a view to informing on labour market themes outlined in the last section.

There are always potential constraints in undertaking the type of empirical analysis suggested for the thesis. For instance, given limitations in terms of data access, the empirical analysis for Dominica is only available for one year, while for St. Lucia and Barbados data are available for just two time periods. Nevertheless, the data are available for relatively recent years in the late 1990s and mid-2000s. The nature and significance of important temporal changes germane to the Dominica labour market in an era of significant re-structuring cannot be adequately investigated, but the research acts as a benchmark for situating Dominica within the empirical literature.

The seminal theoretical work of Lewis (1954) emphasized the importance of dualistic labour markets in the Caribbean economies. It can be difficult to empirically characterize this dichotomy in a meaningful manner and so the approach in this study is to model labour market earnings without distinguishing *ex ante* between formal and informal sectors. This is not a major omission as controls introduced into the earnings model for all countries are likely to capture aspects of this informality (e.g., industrial attachment and employment status). Separate modelling of the determinants of labour market earnings by employment sector (e.g., through separating the data by government, self-employed and private sector and modelling these employment outcomes endogenously) is also avoided in favour of an econometrically simpler and more parsimonious parameterization of the earnings determination process. The primary reason for this restrictive approach is the problems related to instrumentation and the absence of adequate instruments to deal with these types of issues.

The examination of inter-industry wage structures provides an enhanced portrait of the earnings determination process in the labour markets in the sub-region in an era of important economic and labour market change. The justification for focusing on the inter-industry wage structure is because it provides the means to determine how policy changes or structural changes are impacting the labour market through the industry sector. Given the differences within and between the selected Caribbean islands, the inter-industry wage differentials are of interest. The review of the existing literature has hitherto not revealed any studies that specifically discuss the inter-industry wage structure in the countries under review.

A systematic approach to the public-private sector earnings differential has not been undertaken for the smaller islands of the Eastern Caribbean region to date. The most relevant studies on the public-private sector pay gap have been undertaken for Haiti (see Terrell 1992); and Trinidad and Tobago (see Coppin and Olsen 2007). The observed deficiencies in the empirical labour market literature for the Caribbean region acts as a motivating factor for undertaking research on this labour market theme in the study. A key issue that the thesis is concerned with is the extent to which the public sector compresses the wage distribution and impacts on the gender pay gap. This theme is thus best viewed as linked to the gender pay gap as much as anything else.

The examination of the gender earnings gap is also timely for a number of reasons. First, studies on gender earnings differentials have not been undertaken on an extensive scale in the Eastern Caribbean. Second, a related point of interest is the renewed emphasis on gender issues in the 21st century. This interest follows from the Beijing Platform of Action in 1995 and the Millennium Declaration and stipulations by international financial institutions on the inclusion of gender indicators within loan and grant documents. Increasingly, governments either conscientiously or through tacit coercion have incorporated into policy, mechanisms to improve gender equality. The study will examine possible movements in the gender pay gap and determine if policy mandates and international attention on gender issues have had a visible impact on gender pay gaps within the Caribbean countries of interest to us. Hence, the research will examine the patterns of pay by gender in the selected Caribbean islands against a backdrop of gender reform.[1]

Background

The economy of the Caribbean dating back to colonial times has had a predominant focus on one major sector. The agricultural sector, particularly banana cultivation, formed the economic engine of growth for the countries of Dominica, and St. Lucia and in the case of Barbados, it was sugar cultivation. However, changes in trade preferences for the entry of bananas and sugar into European markets, the contraction in commodity prices, adverse weather and increased international competition has led to the reduced viability of banana and sugar production. Over time the countries were forced to reorient their economies to maintain economic growth and generate employment. The changes in the economic base from agriculture resulted in an increased emphasis on services, particularly tourism and more recently financial services.

The countries in the Eastern Caribbean are confronted with a host of labour market challenges, namely: high levels of youth unemployment; mismatch in the skills sets of jobseekers and the skills in demand by employers; low levels of productivity being rewarded by high wages; segmented labour markets; and emigration of skilled labour (see Economic Commission for Latin America and the Caribbean (ECLAC) 2005; World Bank 2005a; 2005b). Some of these factors clearly have an impact on the labour markets of the Caribbean, though it is not the purpose of this thesis to address these explicitly.

The selected countries exhibit a number of close similarities but also some key differences in terms of progress in economic and social development. An understanding of the macroeconomic and social indicators is useful for identifying the similarities and differences between the countries. Table 1.1 provides an overview of the main macroeconomic, social and labour market indicators for Barbados, Dominica and St. Lucia.

In the selected countries an estimated three-fifths of the active population participate in the labour market, with labour force participation rates being higher for males in all the countries under review. About three-quarters of males participate in the labour market

compared to 55 percent of females in Dominica and 62 percent of females in Barbados and St. Lucia. The observed labour force participation rates for females in the selected countries are higher than those observed for example, in Belize (36.8 percent) and Trinidad and Tobago (47.5 percent).[2] The labour force participation rates for females in the selected countries points to growth in the number of women entering the labour force due in part to greater educational attainment particularly in post-primary education; expansion in occupational activities for women; and a reduction in fertility rates (see Downes 2004).

While the labour force participation rates in the selected countries are broadly similar, the unemployment rate exhibits marked differences. Of the three countries unemployment is lowest in Barbados and this is partially an indication of its high level of economic development as shown by the GDP per capita (US$13,314). In St. Lucia and Dominica unemployment is in the double digits, largely on account of the decline in employment in the agricultural industry. In all instances the rate of unemployment is higher for women. Another key observation of the labour markets of the selected countries is a high prevalence of youth unemployment of about 40 percent. The incidence of youth unemployment in two of the three countries under review is higher for males and may reflect the increasingly lower educational attainment of males in Caribbean labour markets.

Social indicators for the selected countries are good, with life expectancy above 70 years and adult literacy rates of 88 percent and above. The 2009 Human Development Index (HDI) ranks Barbados at 37 in the category with advanced economies. The HDI rate for Barbados is the third highest in the Western Hemisphere, with the United States and Canada holding the other two ranks for the Americas. St.Lucia (69) and Dominica (73) record lower HDI rankings than Barbados, but nevertheless, these rankings still signify good levels of human development, given that the analysis is based on a ranking of 177 countries.

Public sector debt in all of the selected countries is well over the 60 percent of GDP benchmark commonly quoted by the European Union Euro zone members and also the standard set by the regional Eastern Caribbean Central Bank for its member countries including Dominica and St.Lucia. Interestingly, in spite of its more buoyant labour

market and relative prosperity, public sector debt in Barbados exceeds GDP in contrast to the other two islands.

Table 1.1 Selected Labour Market, Social and Macroeconomic Indicators

	Barbados	Dominica	St. Lucia
Labour Market			
Labour Force Participation Rate 1/			
Male	75.0	75.5	75.2
Female	62.2	54.5	62.3
Total	68.2	65.2	68.7
Unemployment Rate 2/			
Male	6.9	13.1	17.5
Female	9.0	19.4	25.0
Total	7.9	15.7	21.0
Unemployment Rate Youth aged 15 – 24 years 3/			
Male	38.0	50.4	46.1
Female	41.6	31.0	35.2
Total	40.0	40.6	40.0
Social and Demographic			
Human Development Index (HDI), 2009 rank) 4/	37	73	69
Population (in millions)	0.285	0.072	0.167
Life Expectancy at birth (in years)	75.4	77.0	73.6
Adult literacy rate (% ages 15 years and above)	99.4	88.0	94.8
Macroeconomic			
GDP per capita, current prices (US$ 2008)	13,314	5,082	5,806
GDP Growth (annual percent change)			
2007	3.4	1.8	1.7
2008	0.2	3.2	0.7
CPI Inflation (average percent)			
2007	4.0	3.2	2.2
2008	8.1	6.3	7.2
Public Sector Debt (in percent of GDP, 2008)	105.9	84.8	61.4

Sources: Labour Market Indicators- International Labour Organisation based on national household surveys; IMF World Economic Outlook; United Nations Development Programme; and World Bank World Development Indicators.

Notes:

(a) 1/ Data are from Labour Force Surveys for years as follows: Barbados (2007); Dominica (1999); St. Lucia (2003).

(b) 2/ Data are from the respective Labour Force Surveys for the years as follows: Barbados (2007); Dominica (1999); St. Lucia (2004).

(c) 3/ Data are from the respective Labour Force Surveys for the years as follows: Barbados (2003); Dominica (1999); St. Lucia (2004).

(d) 4/ A low rank indicates a strong position

Thesis Structure

The thesis is structured as follows. In chapter two, a study of the seminal literature on the main research themes of the thesis is presented. The literature review also discusses the empirical findings of relevant available studies undertaken for the Caribbean on the themes of interest. The data description is presented in chapter three. The econometric methodology and the modelling procedures are discussed in chapter four. Chapters five to seven then presents the country backgrounds and empirical results for Dominica, St.

Lucia and Barbados, respectively. In Chapter eight, the empirical findings for the selected countries are assessed and compared. The subsequent chapter nine presents the results for two alternative regression model specifications to examine the robustness of the results obtained in the earlier chapters. Chapter ten concludes and provides some policy recommendations.

ENDNOTES

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[1] The Organisation of Eastern Caribbean States Secretariat through a consortium of donor agencies has undertaken a gender reform project to put in place the legislative framework for gender reform.
[2] See www.ilo.org

CHAPTER 2: LITERATURE REVIEW

Introduction

In this chapter, the review of the empirical literature presents the main findings from available Caribbean studies on the research themes of this thesis. Also, discussions on the seminal studies are reviewed to contextualise the discussion and situate the analysis for this research alongside the empirical literature.

The literature on labour market themes undertaken specifically for the Eastern Caribbean is limited. However, a selection of studies in the empirical literature has investigated different labour market themes for the broader Caribbean area. In the existing empirical literature an analysis of returns to educational investment have been undertaken by Bourne and Dass (2003) for Trinidad and Tobago; Griffith (2001) for Barbados; Horowitz and Schenzler (1999) for Suriname; Bedi and Born (1995), Bedi (1997) for Honduras; and Honig (1996) for Jamaica. The gender pay gap is investigated by Coppin and Olsen (1998), Olsen and Coppin (2001) and Sookram and Watson (2008) for Trinidad and Tobago; and Coppin (1996a; 1996b) for Barbados. The empirical studies by Scott (1992) and Hotchkiss and Moore (1996) examine the gender pay gap in Jamaica and identify a disparity in gender earnings with females receiving a pay disadvantage in the labour market. Terrell (1992) and Coppin and Olsen (2007) analyse the earnings differential within the public sector for Haiti and Trinidad and Tobago, respectively. The theme of inter-industry wage structure has not been examined explicitly for the Eastern Caribbean.

The structure of this chapter is now outlined. Section one provides a review of the empirical literature on the rates of return to education. The existing literature on the inter-industry wage structure is examined in section two and in section three an assessment of the public-private sector pay premium is undertaken. Section four outlines the main findings in the literature on the gender pay gap. Section five summaries the literature findings and concludes.

Rates of Return to Education

The general literature on the rates of return to education is copious, since the seminal work of Schultz (1961), Becker (1964) and Mincer (1974). In more recent times, the practical computation of the rates of return and the interpretation of the analysis with respect to developing countries have been extensively analysed by Psacharopoulos (1973, 1985a, 1985b and 1994) and Psacharopoulos and Patrinos (2004). Given the growth in the rates of return literature from the 1970s and onwards, criticisms of the accuracy of existing rates, the suitability of the estimation techniques and the data quality have featured strongly in the literature.[1] This section outlines the seminal studies; reviews the different rates of returns estimation methods; summarizes and discusses the findings in the available and relevant studies on rates of return for the Caribbean, and Latin America; and presents some key criticisms contained in the literature.

The literature identifies two variants of rates of return to education investment, namely the social and the private rates of return. The social rate of return considers the impact that one person's education can have on the welfare of others, thus it is the gains or benefits accruing to society (Todaro 1982). The social rate of return is computed as the private rate of return plus the net social benefits of schooling (Schultz 2004). The private rate is defined as the relation between the costs incurred by private individuals in obtaining education and the rewards that individuals obtain from their investment in education. Hence, the private rate of return identifies the profitability of investing in education for the individual (Schultz 1988). The benefits to the individual for the extra investment in education are observed in the form of extra lifetime earnings. In this thesis the emphasis is on the private rate of return as the additional data required to compute the social rate of return is not available for the selected countries.

In the empirical literature two main estimation techniques are generally used for deriving the rates of returns to educational investment, the discount method and the Mincerian earnings function (see Psacharopoulos et al. 2004). The two methods have been utilised extensively in estimating the rates of return to educational investment.

However, more recent studies, as is the case in this thesis, use earnings functions to derive the rates of returns (see Psacharopoulos et al. 2004). Also evident in the literature is the combining of the discount method and the Mincerian approach to form a mixed approach to arrive at the rate of return to education. This approach is not explored here; however, more details are available in De la Fuente and Jimeno (2005). As most studies have shown, irrespective of the estimation method used the results appear broadly similar (see Heckman, Lochner and Todd 2005).

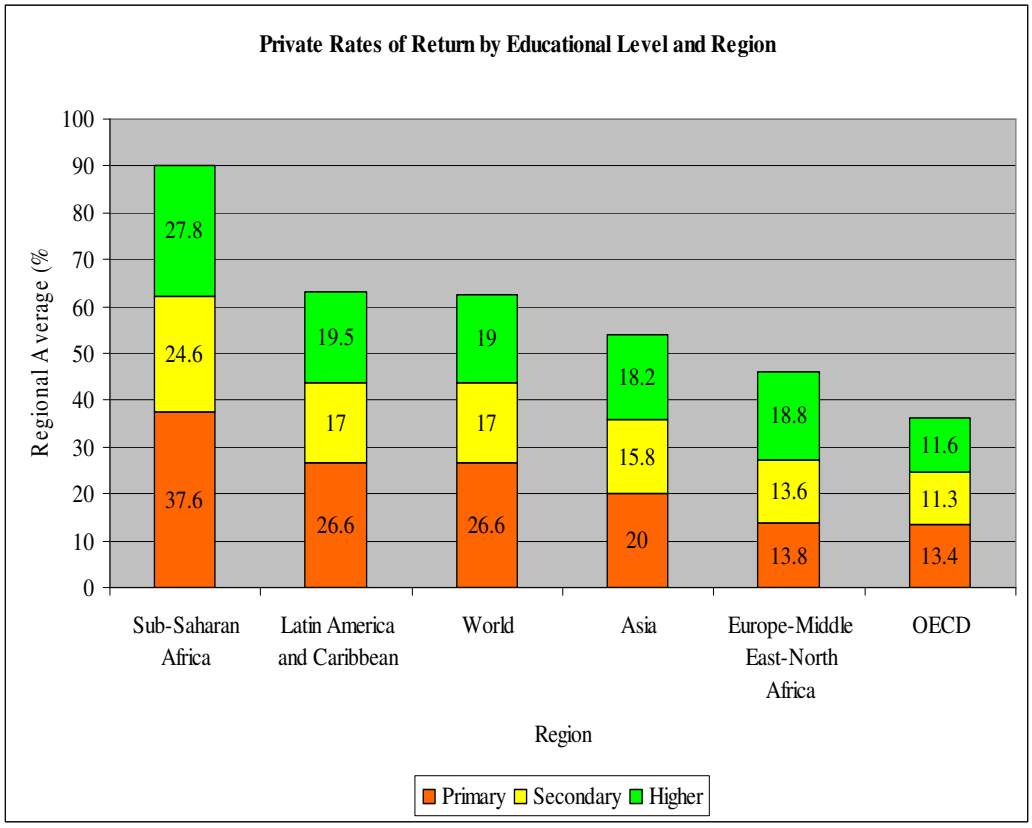
In the empirical literature the conventional wisdom is that returns to education in developing countries are higher than the returns obtained for developed countries (see Psacharopoulos et al. 2004). In short, the empirical results point to an acute scarcity of education in developing countries which thus yields higher rates of return to educational investment. The scarcity in educational skills leads to higher wages for the individuals with the scarce skills as a reward for their educational investment.

Psacharopoulos et al. (2004) compile rates of returns to investment in education by level for 95 countries, about one-half of which are countries in Africa and Latin America. Of the countries for which data on private rates of return by educational levels are available, in about one-third the private rates of return to educational investment is highest at the primary level. The majority of the countries with the high rates of return to primary education are in Latin America. It is noteworthy that in the aforementioned countries with the highest rates of return at the primary level, the data used relate to 1989/1990 for the Latin American and Caribbean countries, with one outlier for 1959; the data for the African studies relate to 1983. In the empirical literature, (see Psacharopoulos et al. 2004) the conventional wisdom is that the rate of return in developing countries is highest at the primary level (see figure 2.1).

Psacharopoulos et al. (2004) in keeping with the premise that rates of return in developing countries are highest at the primary level, suggests that in developing countries where returns to primary education are low especially for women this poses a policy concern. The conventional patterns in the empirical literature are largely based on findings for developing countries in Africa and Latin America. However, in terms of a caveat, the average years of schooling in the Caribbean surpasses years of schooling in developing countries in Africa, averaging eight years in Latin America and the

Caribbean as compared to seven years in Africa (see Psacharopoulos et al. 2004). Also, the selected countries in the thesis have met the primary education goal enshrined in the Millennium Development Goal of universal primary education and have gone beyond this to achieve universal secondary education. Thus, taking account of the attainment of universal secondary education, the average years of schooling in the Eastern Caribbean hovers in the range of 8 – 10 years.

Figure 2.1. Privates Rates of Return to Education by Educational Level and Region



Source: Compiled from Psacharopoulos and Patrinos (2004).

The review of literature for developing countries utilizing more current datasets shows contractions in the rates of returns to primary education, while the returns to post-secondary education is increasing. In the literature, countries in Sub-Saharan Africa have the highest private rates of returns to educational investment followed by Latin America and Caribbean countries. The rates of return to education for Latin America and the Caribbean are in the range of 17 to 26.6 percent, for countries in Sub-Saharan Africa the returns range from 24.6 to 37.6 percent (see figure 2.1).

The countries comprising the Organisation for Economic Co-operation and Development (OECD), North Africa and the Middle East register the lowest private rates of return for primary education and overall (see figure 2.1). In fact, as more recent studies on the rates of return become available the conventional wisdom for high rates of returns at all educational levels in Sub-Saharan Africa is slowly being revised (see Oyelere 2006).

The literature on the rates of return to education for the Caribbean region is limited, but the available studies identify returns at variance to the levels normally postulated in the literature for developing countries. The countries of the Caribbean albeit developing countries have more advanced and all-inclusive educational systems than some of the Sub-Saharan African countries for which rates of return have been computed in the empirical literature. Government expenditure on education in the Caribbean is quite high at 6.5 percent of GDP. In the Organisation of Eastern Caribbean States (OECS) countries Government educational spending averages 7.1 percent as compared with average spending in Latin America of 4.1 percent (see World Bank 2007). In the Caribbean, there is a general sense of obligation on the part of the government to provide educational access, but notwithstanding the high spending the opinion of the World Bank (2007) is that investment on education needs to be better managed if the outcomes are to be commensurate with the investment.

There are noteworthy gender differences in the rates of returns to education, (see Psacharopoulos et al. 2004). The estimates of the rates of return to education for 95 countries provide average returns for females greater than for males in two-thirds of countries.[2] In analysing the rates of returns by educational level, the rates of returns for primary and university education are lower for females. However, at the secondary level the return to educational investment is higher for females. It is easy to assign cultural and societal norms in developing countries as the underlying factors for the lower private rates of return for females at the university level. In developing countries in situations of scarce resources, by way of conjecture, parents opt to educate male rather than female children. In the empirical literature men on average receive more schooling than their female counterparts (see Psacharopoulos et al. 2004), however for Caribbean countries women are in possession of higher average years of schooling than

males (see Coppin 1996a, 1996b). The literature suggests discrimination as an underlying factor for the lower average pay for women, but despite this fact the rate of return to education for women is typically higher than that of males (see Psacharopoulos et al. 2004).

A number of criticisms and words of caution (see Bennell 1996b, 1996c; and Griliches 1977) have been expressed in the literature on discrepancies and deficiencies arising in the computation of rates of return. Bennell (1996c) observes that increasingly, rates of return to education are used as a diagnostic tool and the computation and analysis needs to be accurate for correspondingly sound policy recommendation to be provided. Bennell (1996c) concludes that the use of the analysis and evidence on rates of return to support policy recommendations on education investment is potentially flawed.

Bennell (1996c) criticises the World Bank's 1995 Education Sector Review by firstly executing a detailed examination of the ways in which rates of return to education research informs government education policy and the concomitant funding priorities. Secondly, Bennell (1996c) questions the role of rates of return analysis as an economic measurement tool for determining the outcomes on education investment.

Moreover, Bennell (1996c) states that comparisons for rates of return by continents are not very effective and informative as there are too many endemic variations. The criticisms put forward by Bennell (1996c) are informative in that they emphasize deficiencies and inaccuracies in the meta-analysis of repeatedly cited rates of return studies. Arising from the criticism of Bennell (1996c), this thesis gives particular attention to acquiring good quality data; and paying close attention to the computation and interpretation of the rates of return estimates. In acknowledging the comments of Bennell (1996a, 1996b, 1996c) the thesis builds upon best practices in the empirical literature and attempts to avoid the empirical pitfalls.

Strands of the empirical literature also criticise the methodology used for computing the rate of return to education (see Bennell 1996b, 1996c; Glewwe 1996). However, Psacharopoulos et al. (2004) conclude that the estimation method has a negligible effect on the estimated rate of return. This conclusion comes from extensive experience of Psacharopoulos (1973, 1985a, 1985b and 1994) in undertaking rate of return to

education analysis for a broad range of countries spanning Latin America, Africa and Asia. The empirical literature (see Psacharopoulos et al. 2004; Bennell 1996b and 1996c) cautions against the inclusion of too many irrelevant independent variables as they steal some of the effects of education on earnings. In the thesis the earnings equation used to estimate the rates of return to education are kept austere to include only the relevant independent variables.

The literature identifies ability, school quality, measurement error, parental education and other socioeconomic factors as potentially important in influencing the rates of return to education but given data constraints these issues are not be addressed here. According to Glewwe (2002), ability although important, is difficult to compute as environmental factors are conflated within it, thus making the pure ability effects difficult to isolate. The difficulty arises in finding ability measures that are not influenced by and as a result correlated with education. Given data constraints, factors such as ability, school quality and parental education are not addressed in the thesis. The lack of attention to the abovementioned socio-economic factors is not a grave omission as the empirical literature provides evidence that the effect of these factors on the rate of return is negligible (see Glewwe 2002 and Card 1994).

Another perspective on omitted effects is found in Bonjour, Cherkas, Haskel, Hawkes and Specter (2003). The authors use data for a set of identical female twins to estimate the rates of return to education in the United Kingdom. Their analysis confirms the general finding that measurement error in schooling levels causes a downward bias in rate of return estimates, while the non-inclusion of ability leads to an upward bias. In fact, Bonjour et al. (2003) conclude that these effects almost cancel each other out, a conclusion Griliches (1977) offered much earlier in the literature. The specialized nature of the data required to effectively address the issue of ability, school quality, parents education and socioeconomic factors are not available to use in this thesis and this is not problematic as the empirical evidence provided by Bonjour et al. (2003); Glewwe (2002); and Card (1994) show that these omitted variables do not exert a significant impact on rates of return to education, rather the impact is negligible.

The most recent and also the most comparable study on the rate of return to education for an Eastern Caribbean country is undertaken by Griffith (2001). Griffith estimates

the private rate of return to education in Barbados drawing on the Mincerian earnings method using one round of the 1999 Labour Force Survey (LFS). Griffith (2001) estimates an augmented Mincerian earnings function containing dummy variables for secondary and university education to derive the rates of return for educational investment and finds estimates that are significantly lower than the existing estimates in the literature for Latin America and the Caribbean (see Psacharopoulos 1973, 1985a, 1985b, 1994; Psacharopoulos et al. 2004).

The private and social rates of return for university graduates in science and technology in Trinidad and Tobago are compared with other fields of study by Bourne et al. (2003). The empirical results using data from a 1999 tracer study finds the highest private rates of return in engineering, medicine and natural sciences followed by social sciences, humanities and lastly agriculture. The study further identifies differences in the rates of returns for specialities within the engineering, natural science and agriculture fields and this outcome acts as a signalling mechanism to students, thereby leading to weaker demand for the study places in the specialities with lower returns to educational investment.

Horowitz et al. (1999) estimate the private and social returns to technical, vocational, and general education in the Republic of Suriname.[3] They use data from a bi-annual random sample of households conducted by the General Statistical Bureau of the Republic of Suriname. The sample contains observations for 7,010 individuals taken from four rounds of the survey over the period 1990-93. Horowitz et al. (1999) use gender-specific wage equations corrected for selection bias. The authors find that returns in the general academic tracks, namely language and mathematics, have a specific gender dimension. In the language track, rates of return to education for females are higher, while males obtain more favourable returns for mathematics. On average, the rate of return to general education exceeds those for technical and vocational education. According to the authors, the size of the rates of return to general, technical and vocational tracks are similar to earlier estimates reported in the empirical literature.

Bedi (1997) utilises a combination of household survey data and data on school quality for 1986 to examine the effects of school quality on the earnings of Honduran males.

The indicators of school quality used are teacher quality, school crowding, teacher-to-student ratio and school infrastructure. Utilising different specifications of the model, Bedi (1997) concludes that school infrastructure and teacher training are the most important indicators of school quality. Bedi (1997) obtains robust and positive results for the effects of schooling on earnings, with students educated in areas with good quality schools receiving incomes higher than their counterparts educated in areas with low school quality.

Bedi and Born (1995) utilise a 1990 household survey data for Honduras to estimate the impact of educational attainment and experience on earnings. The empirical results are in conflict with global patterns, as they find that returns to educational investment increase with education levels. This means that the rate of return to primary education is the lowest and this runs contrary to the results reported by Psacharopoulos (1994).

Fiszbein and Psacharopoulos (1993) employ a 1989 household survey for Venezuela to carry out a cost-benefit analysis of educational investment. In Venezuela, unlike most other countries, government outlays on tertiary education account for about 40 percent of education expenditures (Fiszbein et al. 1993). The high outlay on tertiary education is an unusual occurrence for Latin American countries and fuels the inquiry into determining the cost and benefits arising from the disproportionate spending on tertiary education in Venezuela. The authors conclude that the investment priority should be placed on primary rather than tertiary education. Overall, Fiszbein et al. (1993) find that the private rate of return to primary education is the highest and this outcome is generally in keeping with other studies undertaken for Venezuela (see Psacharopoulos and Alam 1991; Psacharopoulos and Steir 1988).

An unintended omission in the analysis is the effect of emigration of the highly skilled on the themes of interest in the study. The effects of emigration and its spillovers are not assessed here, as the labour force survey data does not support questions that capture migration. Thus selection issues raised by migration cannot be explicitly addressed given these data limitations. In the case of the Caribbean countries where unemployment is in double digits, migration frees the domestic labour markets by providing avenues for the educated labour force to find employment in some cases commensurate with their educational qualifications. In the case of Dominica and

St.Lucia where no resident universities are available suitably qualified students are forced to look outside of these countries to further their education and as expected many never return. Thus, in the absence of the data we could only speculate that the emigration of high quality workers is likely to potentially upward bias the rate of return to higher education given the scarce nature of highly educated workers.

The analysis in this thesis does not assess returns by faculty for example medicine, engineering and law, but this evidence would prove instructive in identifying the skills gaps in the region. The effects of migration on the return to education, the gender pay gap and public-private sector pay gaps have important implications for policy. Evidence from the World Bank's Migration and Remittances Factbook 2011, using data for 2000, puts ten of the countries in the Caribbean in the top ten for the emigration of their tertiary educated population. Two of the countries in the thesis, St. Lucia and Dominica feature in that ranking with an estimated 71.1 and 64.2 percent respectively, of the tertiary educated population having migrated. The shortfall of emigration for these countries is the fact that the Governments have not harnessed the potential of the diaspora as a source of knowledge transfer, either through entrepreneurship to fuel vibrancy into the lagging private sector or by drawing upon the diaspora to fill highly specialized job openings.

Inter-Industry Wage Structure

The industry structures in the Caribbean are of interest because of the transition from agriculture to service industry focus in Barbados and St. Lucia. The review of the existing literature has hitherto not revealed any studies that specifically discuss the inter-industry wage structure in the countries under review. In the absence of studies on the inter-industry wage structure for the Eastern Caribbean the following discussion is brief, focusing on a few of the more pertinent empirical studies from the wider literature.

The analysis of the inter-industry wage structure for advanced economies is plentiful and includes empirical research by Krueger and Summers (1988), Haisken-DeNew and Schmidt (1997); Zanchi (1995) and Teulings and Hartog (1998) for the United States;

Edin and Zetterberg (1992) for Sweden; Vainiomäki and Laaksonen (1995) for Finland; Haisken-DeNew and Schmidt (1997) for Germany; Zweimüller and Barth (1994) for Austria and Norway; Rycx (2003) for Belgium; Gannon and Nolan (2004) for Ireland; and Teulings and Hartog (1998) for the United Kingdom.

Edin and Zetterberger (1992) and Zanchi (1995) use the standard wage functions to compute the inter-industry wage structure using the procedure outlined in the seminal study by Krueger and Summers (1988). The authors measure the variability in wages by the standard deviation in industry wage differentials. They normalize the industry differentials by referencing the wage differences in relation to an employment weighted mean as opposed to a base group. The Krueger et al. (1988) approach is used in this paper and further discussions on the methodology are presented in chapter 4. Zanchi (1998) uses a different approach from the normalization procedure of Krueger and Summers (1988), by using one model to derive alternative parameterizations from which sampling variances can be derived.

Krueger et al. (1988) examine the differences in wages for similarly skilled workers in different industries and finds that industry structure has an impact on an employee's wage. They find that the dispersion in wages across industries is large and remains persistent over time. Haisken-DeNew and Schmidt (1997) caution that in using the Krueger et al. (1988) approach care must be taken to calculate the exact standard errors of the differences, if not done, the standard errors of the estimated differentials are overstated and this leads to the underestimation of the overall variability. Their suggestion is adhered to in the current thesis.

Rycx (2003) discusses the role of collective bargaining as contributing to the inter-industry wage differential in the private sector in Belgium. Rycx (2003) finds inter-industry wage differentials are higher in instances where collective agreements are negotiated at the firm level. The empirical findings show that employees covered by a firm specific collective agreement earn on average and *ceteris paribus* 5.1 percent more than their counterparts covered by non-company collective agreements. In the countries of the Eastern Caribbean although the strength of the trade union movement has diminished from the prominence of the 1960s, in some countries unions for port workers, police, teachers and civil servants are still able to negotiate effectively and

obtain pay increases for members. The fact that these jobs are in the public sector is significant as this is where unions in the Caribbean are strongest.

Krueger et al. (1988) note that the pattern of wage differentials in industries in advanced economies is relatively stable over time. In fact comparisons of workers across countries have found that despite comparable education and job market experience workers earn different wages depending on industry attachment (see Gannon and Nolan 2004). The authors in their analysis for Ireland, finds differences in earnings across industries in Ireland and attributes the wage differentials to human capital endowments, employment experience, unobserved individual and job characteristics and also efficiency wages and rent-sharing with the latter two attributes based on circumstantial evidence.

In the empirical literature the estimates for the overall variability in inter-industry wage dispersion varies from lows in Sweden (0.04) and Austria (0.05) to highs in Canada (0.137), United Kingdom (0.143) and the United States (0.141) (see table 2.1). Gannon and Nolan (2004) reports that the magnitude of the inter-industry wage differentials in developed countries may be on account of corporatism in the wage bargaining structure of the respective country. Thus, low levels of dispersion in the inter-industry wage differentials are observed in the more corporatist countries.

Table 2.1. Dispersion of Inter-Industry Wage Differentials

	Year	Dispersion of Inter-Industry Wage Differentials
Sweden	1981	0.0436
Austria	1983	0.0502
Denmark	1990	0.0538
France	1992	0.0576
Finland	1987	0.0646
Netherlands	1985	0.0664
Belgium	1995	0.0740
Norway	1989	0.0852
Germany	1988	0.1100
Switzerland	1991	0.1130
Ireland	1996	0.1130
Canada	1986	0.1365
USA	1988	0.1411
UK	1991	0.1427

Source: Gannon and Nolan (2004)

In the empirical literature on inter-industry wage differentials for advanced economies there is evidence of high-paying and low paying industries in the presence of controls

for measured worker characteristics (see Krueger et al. 1988). The review of the literature has not identified any work on the inter-industry wage structure for the Caribbean and this motivates its analysis in the thesis. The results of this paper will seek to determine if there exists similar consistency in high-paying versus low paying industries in the Eastern Caribbean, and also if the wage differential across industries have remained constant over time. However, in contrast to other studies in this literature, the thesis only exploits industry-level information at the one-digit level.

Public Sector versus Private Sector Wage Gap

The seminal literature on the public-private sector wage gap is ascribed to Smith (1977), in a study reviewing the public- private sector pay gap for developed countries. The work on public-private sector pay gap for developing countries followed many years later with analysis for example by Anós Casero and Seshan (2006) for Djibouti; Coppin and Olsen (2007) for Trinidad and Tobago; Glinskaya and Lokshin (2005) for India; Hyder and Reilly (2005) for Pakistan; Lindauer and Sabot (1983) for Tanzania; Stelcner, Van der Gaag, and Vijverberg (1989) for Peru; Tansel (2005) for Turkey; and Terrell (1992) for Haiti.

The research on the theme of the public sector pay premium remains limited for the Caribbean. The analysis of the public sector pay premium is important as the public sector wage setting practices has implications for other sectors, through spillover effects akin to herd behaviour. In some countries in the Eastern Caribbean the public sector is the largest single employer and the wage setting practices of the public sector could be used as a benchmark by the private sector, especially in cases where there is no minimum wage (see Terrell 1992). The fiscal operations of central governments in the Eastern Caribbean due to the small and open economies and the exposure to external shocks fluctuate constantly between deficit and surplus positions. In the Eastern Caribbean the public sector wage bill accounts in some instances for as much as 50 percent of current expenditures (see IMF 2004, 2007, 2008).[4] As the countries in the Eastern Caribbean are confronting economic challenges and streamlining the operations of government, the presence of wage gaps favouring public sector employees provides

solid evidence to inform policy to control further growth in public sector wages. The public sector is an employer to about one-fifth of the population in the selected countries and it is important to determine whether public sector employees earn a premium above the private sector wage and how is it sustained in situations where the public sector generates fiscal accounts deficits.

Coppin et al. (2007) investigates the public-private sector earnings determination process for Trinidad and Tobago, using data from the 1993 Continuous Sample Survey of the Population. The authors find large earnings premium for public sector employees and this is explained by differences in returns to characteristics valued by the labour market. Also, women are more likely to benefit from the payment of public sector premia.

Anós Casero et al. (2006) analyse the public-private sector wage gap for the African country of Djibouti using 1996 household survey data. Their findings reveal a wage premium for public sector employees. The observed wage premium accrues more to males and individuals with parents in the public sector. In fact, Anós-Casero et al. (2006) find the wage premium is unrelated to individual's human capital skills and personal traits. Of additional relevance in the findings in Anós Casero et al. (2006) to the thesis is the empirical evidence on higher rates of return to post-secondary educated public sector employees as compared to their private sector counterparts. In this thesis, the rate of return by employment sector is not investigated. However, the analysis of the composition of the educational attainment of individuals attached to the private, public and self-employment sectors is discussed in the data chapter (i.e. chapter 3). The decomposition of the employment sector data to determine educational attainment is instructive to understand and possibly explain the variations in the public-private sector pay gap.

Terrell (1992) analyses the selection process into public and private sector employment using 1987 data for Haiti to determine if public sector employees earn a wage premium. Terrell assumes three distinct labour markets – private sector and two public sector segments namely, state owned enterprises and public administration. Terrell concludes that public sector employees have higher mean wages, are better educated and have on average more years of job experience. Terrell (1992) finds a large public-private sector

pay gap. The employees in the public sector receive a rent, with the premium in the state owned enterprises segment being higher than in the public administration segment.

In general, the public sector pay premium is larger in developing countries. For example in Trinidad and Tobago the public sector pay gaps ranges from 63 percent for males to 114 percent for females (see Coppin et al. 2007). The authors suggest that the presence of a larger public sector pay premium for women acts to minimize the level of gender inequality in the economy. The public sector pay premium is estimated at about 15 percent for the United States (US) in 1993 (see Filer, Hamermesh and Rees 1996).

Gender Pay Gap

The incidence of gender pay gap is an age old occurrence with biblical reference as far back as the Old Testament.[5] The lower rate of pay for women is a persistent outcome in both developing and developed countries irrespective of educational attainment and other employee characteristics of women (see Blau and Kahn 1992; 2003). The attention here on the gender pay gap has merit as it provides a basis to assess the magnitude of the pay gap and to determine if over time with economic development the gender pay gap narrows as suggested by Polachek (2004).

The empirical literature on the gender pay gap is extensive (see Weischselbaumer and Winter-Ebmer 2003; Blau et al. 1992 and 2003). However studies on the gender pay gap are not substantial for the Eastern Caribbean. A number of studies in the edited text of Psacharopoulos and Tzannatos (1992) provide evidence of gender earnings differentials in Latin America and the Caribbean. Of the 21 studies in the text, one provides a discussion for the Caribbean country of Jamaica. This again points to the dearth in the literature on the labour market earnings determination process in general and more specifically matters relating to gender earnings in the Caribbean as a whole.

In the available studies for the Caribbean on gender wage gaps, (Olsen 1996a, 1996b; Coppin et al. 1998; Olsen et al. 2001; and Sookram et al. 2008) the gender pay gap is computed for Trinidad and Tobago and Barbados. Hotchkiss and Moore (1996) and Scott (1992), provide estimates for Jamaica. The evidence from the literature on the

gender earnings gap indicates that female employees in Trinidad and Tobago, Barbados and Jamaica earn less on average than their male counterparts. Women in the Caribbean labour force in many cases are better educated than males but nevertheless they face a pay disadvantage, which the empirical literature concludes is due to gender discrimination.

The unadjusted male-female log earnings differential in Trinidad and Tobago using data from 1993 is estimated at 19 percent (see Olsen et al. 2001). The other studies obtained gender pay gaps of 15 percent for Barbados and 73 percent for Jamaica. In the case of Barbados, Coppin (1996a) extends the earnings equation analysis beyond the rate of return estimates to obtain the male and female earnings differentials.

In order to examine the effects of education on earnings and the influence of discrimination, tastes and circumstances, Dougherty (2005), uses a Blinder-Oaxaca decomposition of the pay gap for different years of educational attainment. Dougherty (2005) concludes that the education of females has a minor but important benefit, as it reduces the gap in earnings between males and females linked to discrimination, tastes and circumstances. Dougherty (2005) contends the presence of the gender pay gap resulting in lower pay for females is attributable to the occupations in which women congregate, thus it suggests female employment attachment are in low pay occupations. This outcome explains in part the reason for the higher rates of return for females over males.

The seminal literature on the gender pay gap is attributed to Oaxaca (1973) and Blinder (1973). In the literature, many studies employ the Oaxaca type decomposition. The use of the Oaxaca decomposition begins with the estimation of the earnings function and thereafter the Oaxaca decomposition is used to derive the gender pay gap by separation of data points. A review of the literature has not identified any later in-depth studies than Olsen et al. (2001) on the gender pay gap for the Eastern Caribbean. In this regard, the use of recent data from the LFS for Dominica, St. Lucia and Barbados will provide an updated cross-country and temporal analysis on the gender pay gap for the Caribbean. However, it should be emphasized that given the nature of the dependent variable (see chapter three), our analysis of the gender pay gap does not exploit the type

of mean ordinary least squares (OLS) regression decomposition popularised by Oaxaca (1973) and Blinder (1973).

The Mincer earnings equation remains a robust econometric technique and hence the reason for its use in the thesis (see Heckman, Lochner, Todd (2003); and Polachek (2003)).

Conclusion

The evidence reported as stylised facts in the empirical literature for the rates of return are as follows. The rates of return are higher in low-income countries than in developed countries; as countries develop the returns to higher education increases, while the returns to primary education declines, on average by approximately two percentage points; the returns to primary education is higher for men than women in developing countries; women have average higher returns to secondary education, while the returns to primary and university education are higher for males (see Psacharopoulos et al. 2004). In the empirical literature for the Caribbean the rates of return differ from the conventionally reported patterns with returns lowest at the primary level. In addition, the returns to women at the university level are higher than those for males; however, the reported patterns of lower returns for women at primary educational level follow the conventional pattern.

The findings in both the literature for developed and developing countries finds the existence of a pay disadvantage for women. In the Caribbean females are in possession of more education than males but encounter a gender pay gap, which is largely attributable to gender discrimination.

As the foregoing review of the literature has revealed, minimal empirical research has been conducted on aspects of the labour market earnings determination processes for the smaller islands within the Eastern Caribbean and the analysis in this thesis provides novel evidence for the smaller islands of Dominica, Barbados and St. Lucia. This fills a gap in our knowledge about these labour markets. The lacunae in the literature are not unexpected given the fragmented geographical space, small area and populations of the

islands, and lack of international interest in Eastern Caribbean labour markets. The absence of research on the nature and structure of labour markets in the Eastern Caribbean prohibits a thorough analysis and understanding of the potential labour market impact of policy change. However this study attempts to contribute to filling this particular void. Table A.2.1 provides a summary of the studies in the empirical literature for the Caribbean utilising earnings functions.

ENDNOTES

[1] Bennell (1996b, 1996c) critiques the existing global rate of return to education literature and those for Sub-Saharan Africa and dispels the notion that the conventional patterns found in the literature are valid. Griliches (1977) highlights the earlier debates arising from the estimation problems and suggests improvements in the rates of return computations by Rosen (1976) and Mincer (1974). See also, Schultz (1988), Behrman and Birdsall (1987), Weale (1993) and Glewwe (1996).

[2] See also Dougherty (2005) for further discussion on the higher rates of return to schooling for females than males but notwithstanding females remunerations are less.

[3] General education is comprised of mathematics and languages.

[4] In fiscal year 2004, the contribution of wages and salaries was the lowest in Barbados (35 percent), followed by St.Lucia (46 percent) and Dominica (51 percent). The fiscal years are as follows: Barbados, 1 April – 30 March; Dominica, 1 July – 30 June; and St. Lucia, 1 April – 30 March.

[5] The occurrence of gender pay gap is mentioned in the Old Testament, with the worth of females evaluated as three-fifths the worth of males. "Set the value of a male between the ages of twenty and sixty at fifty shekels of silver, according to the sanctuary shekel, and if it is a female set her value at thirty shekels" (Leviticus (NIV), 27: 2-4).

CHAPTER 3: DATA DESCRIPTION

Introduction

The data used in the research are obtained from national Labour Force Surveys (LFS) in Dominica, St. Lucia and Barbados. The data used in the thesis are of good quality as the statistical offices utilize a standardized LFS questionnaire based on 'concepts and definitions' developed by the International Labour Organisation (ILO). In addition, data collection in the selected countries is done by trained staff and overseen by experienced survey specialists.

Section one presents a description of the LFS data for Dominica. Section 2 provides details on the St. Lucia data and the final section discusses the composition of the Barbados LFS data used in the analysis.

Section 1: Dominica Data Description

The data used in the analysis for Dominica is derived from the LFS undertaken in 1999. The Dominica Central Statistical Office (CSO) utilizes a two-stage sample approach. The first stage is the primary sampling units and these are the enumeration districts into which the country has been sub-divided for the purposes of the decennial population census and subsequently the LFS. The CSO assigns stage two as the ultimate sampling units and here household clusters are selected from each of the enumeration districts of stage one. At stage two, demographic and labour market information is compiled for all individuals in the household (see Government of Dominica 1999).

The LFS covers all persons who are either at work or looking and available for work. The survey questionnaire consists of questions that elicit responses on an individual's age, gender, ethnic group, educational attainment, and district (or parish) of residence. The LFS also asks about a respondent's labour force status (i.e., unemployed, employed or out of the labour force) and, if employed, detailed questions on the nature of employment including labour market earnings, the number of hours worked in the

reference week, sector of employment (i.e., private sector, government or self-employed), job tenure and industry affiliation. The survey thus contains sufficiently comprehensive information to model adequately an individual's labour market earnings and the primary themes of interest in the study.[1]

The key earnings variable used in the analysis is derived from a question that asks respondents the amount of their actual monthly earnings. Interviewers, with the aid of a 'flash-card', allocated the responses for the gross monthly earnings across thirteen mutually exclusive interval-coded categories. The use of interval codes is partly motivated by concerns related to confidentiality but some virtue can be made of this in that the elicited responses are likely to reduce a respondent's reporting bias. The nature of the recorded responses represents something of a constraint in regard to the empirical modelling of earnings but one that can be overcome by use of an interval regression model (see Chapter four for further details). The gross monthly earnings assigned to the thirteen mutually exclusive interval categories ranges from Eastern Caribbean Dollar (EC$) $0-$99 in category one to EC$3,999 or more in category thirteen. On average about three-quarters of the employed cohort earn EC$0-$1,299, this earnings range corresponds to earning category six. Table 3.1 below presents the monthly earnings intervals for the Dominica sample.

The logplots of earnings and hours are shown in Graphs A.3.1 – A.3.6. In Dominica the density of the sample hovers around ln(hourly wage) of 2 with a density at the apex of 0.6. At the right tail of the density plot, less than 0.2 percent of the sample has ln(hourly wage) in excess of 4. Wages follow a normal distribution and likewise hours with the mean hours worked by the employed group in Dominica clustered around 40 hours.

In the graph on hours for Dominica for the full sample (see graph A.3.4) a density of 0.1 at the highest peak corresponding to about 40 hours per week. There are a few fluctuations below 40 hours, but this does not point to an employment culture based on part-time work. In fact we conjecture that the observed hours of work below the typically expected 40 hours is assigned to public sector employees who work on average 35 – 40 hours per week. In addition, workers within the agriculture sector keep more informal hours, but nevertheless the work is considered full-time work. In graph

A.3.6 the density of males working 40 hours per week is higher at near 0.8 percent compared to females at 0.6. Overall the density provides evidence in support of the limited engagement in part-time work and again the hours below forty hours given knowledge of the Dominican labour market would not be termed part-time work by the true definition of pert-time, instead it may be more akin to underemployment versus part-time work.

Table 3.1. Dominica Monthly Earnings Intervals Frequency (percent)

Earnings Interval (EC$)	1999		
	All	**Male**	**Female**
$0 – $99	2.1	1.1	3.6
$100 – $299	6.9	5.3	9.5
$300 – $499	19.2	17.6	21.8
$500 – $799	19.1	19.8	18.0
$800 – $999	12.7	13.8	10.9
$1000 – $1299	12.9	14.2	10.9
$1300 – $1499	5.3	5.4	5.0
$1500 – $1799	4.7	4.9	4.5
$1800 – $1999	3.4	4.0	2.5
$2000 – $2499	6.2	5.6	7.3
$2500 – $2999	2.3	2.3	2.3
$3000 – $3999	3.7	4.2	3.0
$4000 and over	1.4	1.9	0.7
Sample Size	1138	698	440

Note:
(a) US$ 1 = EC$ 2.70

The empirical analysis is restricted to those respondents aged between 15 and 64 and focuses exclusively on the determinants of main job earnings. After data cleaning within this age-group and discarding those cases with missing values for the key variables of interest (earnings, hours of work, industry group, and education), useable observations on 1,920 individuals are left, of which 1,138 are gainfully engaged in an employment activity. See tables 3.8 and 3.9 for LFS data composition.

Table A.3.1 of the appendix provides a description of the variables used and table 3.2 presents the summary statistics. The average age of the sample is 35.6 years while the average age of the employed respondents is about 37.7 years. The average age of the employed male cohort is higher at 38.2 years compared to 37.0 years for employed females. Men account for 51.5 percent of the full sample and about 60 percent of the employed. A third of respondents are classified as self-employed, with about two-fifths of the self-employed being males. About one-fifth of the employed sample is found to be in government (or public sector) employment with slightly more females than males

claiming attachment to the public sector. The private sector is the sector of choice for females and employs about one-half of all females compared to about two-fifths of males. Over one-half of respondents in employment have held their current jobs for five or more years.

The data for industries is coded according to the ILO International Standard Industry Classification (ISIC) Rev 3.1 at the one-digit level. The inter-industry wage structure is investigated through the use of one-digit industries and this is less satisfactory than two-digit industries as this could mask important differences within the one-digit industries. A quarter of those employed are in the agricultural sector, the next largest employment sectors are retail sector (14.7 percent) and social services (12.2 percent). A breakdown by gender places the largest concentration of females in social services (20.7 percent), followed by the retail sector (19.6 percent). In the agricultural and construction sectors the margin of males employed in the sector surpasses the percentage of females employed in the sector. Thus, the data identifies a gender bias in industrial concentration, the evidence highlights female dominated sectors (social services, retail, domestic services, and hotels) and male dominated sectors (agriculture, construction and transport).

The population resides on the coastline as the island's interior is comprised of rugged mountain peaks and dense rainforest cover. Employment is concentrated in the capital city, Roseau and as a result slightly less than one-half of the employed population resides within a ten mile radius of the capital city. The island's population is distributed throughout ten parishes and about one-third of the employed sample resides in the parish of St.George (comprised of the capital city Roseau and the immediate rural hinterland). The second largest concentration of population of approximately 15.6 percent is found in St. Andrew on the Northeast coast of the island. St. Andrew is predominantly an agricultural parish and one of the main areas for banana cultivation. The third largest district in terms of population, St. David (11.6 percent) is also on the northeast coast of the island and home to the Carib Indians, the island's indigenous ethnic minority. Approximately three percent of those in employment are drawn from the Carib population, and a slightly higher proportion of Carib females than males are in employment. The Carib (or Amerindian) were the main inhabitants at the time of

Christopher Columbus's arrival in 1493, and even well into the eighteenth century until the island was initially settled by the French and subsequently the British in 1783.

The structure of the island's formal educational system embodies features of the British education system. This consists of seven years of primary schooling, followed by five years of secondary schooling. Thereafter, selected and suitably qualified students can progress to the tertiary or university level for two and three years respectively. Nearly 60 percent of respondents in the Dominica LFS have only primary education as their highest qualification, one fifth have successfully finished secondary schooling, and about 13 percent have completed their education to either tertiary or university level. In terms of gender, more males have terminal primary education (64.5 percent) as compared to females (47.3 percent). According to the data, females are in possession of more years of schooling than their male counterparts. The data suggests an estimated one-half of females are in possession of qualifications at the secondary level and beyond, and this compares to only one-quarter of males reporting comparable qualifications. The lower educational attainment by males is unusual as they account for about 51 percent of the population, but in fact the incidence of male marginalization has increasingly become a new occurrence in the Caribbean (see World Bank 2005b). The summary statistics for Dominica follows in table 3.2.

The summary statistics on the educational qualifications of private and public sector employees and the self-employed identifies the public sector as the employment sector of choice for persons with post-secondary qualifications. In the employed sample, about one third of public sector employees are in possession of post-secondary qualifications, this compares to 12.0 percent and 3.6 percent of private sector employees and the self-employed, respectively. In fact, the majority of self-employed individuals (85.1 percent) in the sample report educational attainment below secondary level.

Table 3.2. Dominica Summary Statistics

Variable	Mean Values - Full Sample			Mean Values – Employed		
	All	**Male**	**Female**	**All**	**Male**	**Female**
HOH	0.3802	0.5035	0.2492	†	†	†
Age	35.5839	35.4651	35.7100	37.7434	38.2149	36.9955
	(13.8903)	(13.9692)	(13.8123)	(12.1129)	(12.4337)	(11.5603)
Agedum_1§	0.2057	0.2133	0.1976	†	†	†
Agedum_2	0.2109	0.2042	0.2180	†	†	†
Agedum_3	0.2271	0.2235	0.2309	†	†	†
Agedum_4	0.1589	0.1628	0.1547	†	†	†
Agedum_5	0.1974	0.1962	0.1987	†	†	†
Male	0.5151	†	†	0.6134	†	†
Carib	0.0271	0.0243	0.0301	0.0308	0.0287	0.0341
No Education§	0.0427	0.0475	0.0376	0.0422	0.0487	0.0318
Primary	0.5818	0.6138	0.5478	0.5782	0.6447	0.4727
Secondary-Incomplete	0.0370	0.0425	0.0311	0.0272	0.0287	0.0250
Secondary	0.2328	0.1891	0.2793	0.2153	0.1562	0.3091
Other Education	0.0031	0.0040	0.0021	0.0044	0.0057	0.0023
Tertiary	0.0719	0.0647	0.0795	0.0879	0.0688	0.1182
University	0.0266	0.0344	0.0183	0.0387	0.0415	0.0341
Tenure_1§	†	†	†	0.1186	0.1132	0.1273
Tenure_2	†	†	†	0.0817	0.0874	0.0727
Tenure_3	†	†	†	0.2276	0.2178	0.2432
Tenure_4	†	†	†	0.1933	0.1862	0.2045
Tenure_5	†	†	†	0.3787	0.3954	0.3523
Log(Hours)	†	†	†	3.5824	3.6271	3.5114
				(0.4497)	(0.3886)	(0.5253)
Private Sector§	†	†	†	0.4236	0.3840	0.4864
Government	†	†	†	0.2047	0.1905	0.2273
Self-employed	†	†	†	0.3717	0.4255	0.2864
Agriculture§	†	†	†	0.2540	0.3281	0.1364
Manufacturing	†	†	†	0.0896	0.0845	0.0977
Utility	†	†	†	0.0167	0.0201	0.0114
Construction	†	†	†	0.0747	0.1203	0.0023
Retail	†	†	†	0.1467	0.1160	0.1955
Hotels	†	†	†	0.0325	0.0115	0.0659
Transport	†	†	†	0.0668	0.0817	0.0432
Finance	†	†	†	0.1019	0.1032	0.1000
Public Administration	†	†	†	0.0598	0.0616	0.0568
Social Services	†	†	†	0.1221	0.0688	0.2068
Domestic Services	†	†	†	0.0351	0.0043	0.0841
Roseau City	0.2240	0.2123	0.2363	0.2267	0.1891	0.2864
Roseau Rural§	0.0938	0.0900	0.0977	0.0861	0.0845	0.0886
St. John	0.0760	0.0698	0.0827	0.0703	0.0673	0.0750
St. Joseph	0.0833	0.0849	0.0816	0.0870	0.0960	0.0727
St. Paul	0.1036	0.1052	0.1020	0.1116	0.1117	0.1114
St. Luke	0.0521	0.0425	0.0623	0.0466	0.0458	0.0477
St. Patrick	0.1271	0.1365	0.1171	0.1002	0.1089	0.0864
St. David	0.1000	0.1132	0.0859	0.1160	0.1318	0.0909
St. Andrew	0.1401	0.1456	0.1343	0.1555	0.1648	0.1409
Sample Size	1920	989	931	1138	698	440

Notes:
(a) § denotes the base group in regression model estimation.
(b) The standard deviations are reported in parentheses for continuous variables.
(c) The 'Other Education' is comprised of basic skills training programs.
(d) 'Tertiary' education constitutes the level between secondary and university education. It comprises academic preparation for the advanced level examinations and certificate level technical skills training.
(e) † denotes not applicable.
(f) See Table A.3.1 of the Appendix for variable description.

Section 2: St. Lucia Data Description

The analysis reported in the St. Lucia chapter is based on the use of LFS data for the years 1996 and 2004. The St. Lucia Statistical Department utilizes a two-stage cluster random sampling procedure in a series of rounds conducted within each year. The quarterly coverage began in 2004 and prior to this the survey was undertaken bi-annually. The LFS data for 1996 and 2004 are based on merging the bi-annual and quarterly samples respectively.

The LFS in St.Lucia provides an important profile of the employed, unemployed and economically inactive population. The survey contains questions to extract information on socio-demographic data (e.g., gender, age, education levels, and district of residence) and a person's current economic activity including employment attachment. The regional variables in the sample are categorised into ten districts for St. Lucia. Castries city is the administrative and commercial capital of St. Lucia and this combined with the residential sections of Castries contains 37.8 percent of all our observations. Vieux Fort is the second main town and accounts for an estimated 8.8 percent of observations.

Respondents are also questioned on the nature of their employment including labour market earnings, the number of hours worked in the reference week, sector of employment (i.e., private sector, government or self-employed), job tenure and industry affiliation.[2] The inclusion of a question in the LFS on actual job tenure or experience is advantageous for the regression model as it minimizes the inherent bias that could arise from the use of potential experience as a proxy. The use of actual experience eradicates the upward biases resulting from overestimation of potential experience.[3] The use of actual experience improves the accuracy of the results especially for females where potential experience used as proxy is ineffective in capturing the intermittent labour market participation of females.

Labour market earnings provide the key dependent variable for the analysis and the information is obtained from a question, which elicits information on a respondent's gross monthly earnings. The responses provided on monthly earnings are allocated across eight mutually exclusive interval-coded categories by the interviewer with the aid of a 'flash-card'. The use of the interval codes, as also in the case of Dominica, is partly

motivated by concerns related to confidentiality. The nature of the recorded responses requires use of an interval regression model in the econometric modelling, the details of which are provided in chapter four. The monthly earnings intervals are presented in table 3.3 below. Logplots for hourly earnings and hours for the samples in 1996 and 2004 are presented below in graphs A.3.7 – A.3.18. In general ln(hourly wages) are clustered around 2 with density between 0.6 – 0.8. In both years the density of hours are observed at 40 hours with density of about 1.0. Again the evidence here indicates that part-time work is not a feature of the St.Lucia labour market and by extension the labour markets in the Eastern Caribbean.

Table 3.3. St.Lucia Monthly Earnings Intervals Frequency

Earnings Interval (EC$)	**1996**			**2004**		
	All	Male	Female	All	Male	Female
$0 – $200	1.9	1.4	2.3	0.9	0.5	1.3
$201 – $399	11.0	5.8	16.9	6.6	5.8	7.6
$400 – $799	32.5	26.4	39.3	23.6	19.0	29.0
$800 – $1199	23.7	27.8	19.0	32.4	34.5	29.9
$1200 – $1999	17.0	21.0	12.5	19.5	22.9	15.5
$2000 – $3999	10.3	12.4	7.9	12.9	12.2	13.8
$4000 – $5999	3.0	4.0	1.8	2.9	3.4	2.2
$6000 or over	0.6	1.1	0.1	1.2	1.6	0.8
Sample Size	2094	1112	982	1362	730	632

Note:
(a) US$ 1 = EC$ 2.70

The empirical analysis is confined to respondents aged between 15 and 64 years inclusive, and focuses on the determinants of main job earnings. The 15 – 64 years age cohort is selected as this age range spans the normal working age cycle.[4] This also renders the analysis comparable across the countries. After data cleaning, 3,994 and 3,349 useful observations were available for 1996 and 2004 respectively. In the 1996 dataset 2,094 respondents were gainfully employed, with males accounting for about 53 percent. In the 2004 dataset, 1,362 respondents were engaged in an employment activity, with 54 percent male. In the latter period the percentage employed recorded a decline and this was reflected in a sharp rise in the unemployment rate**.**

Table 3.4. St. Lucia- Summary Statistics for those in Employment

Variables	1996 Mean Values			2004 Mean Values		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Age (years)	34.91	35.40	34.34	36.72	37.01	36.39
	(11.47)	(12.15)	(10.62)	(11.17)	(11.52)	(10.76)
Male	0.5310	†	†	0.5360	†	†
No Education§	0.0406	0.0486	0.0316	0.0228	0.0329	0.0111
Primary	0.5597	0.5782	0.5387	0.4684	0.5014	0.4304
Secondary-Incomplete	0.0377	0.0360	0.0397	0.0367	0.0397	0.0332
Secondary	0.1925	0.1619	0.2271	0.2482	0.2178	0.2832
Other Education	0.0033	0.0036	0.0031	0.0088	0.0082	0.0095
Tertiary	0.0425	0.0324	0.0540	0.1043	0.0740	0.1392
University	0.0267	0.0306	0.0224	0.0448	0.0342	0.0570
Tenure_1§	0.0530	0.0594	0.0458	0.0529	0.0562	0.0491
Tenure_2	0.0487	0.0450	0.0530	0.0602	0.0603	0.0601
Tenure_3	0.3840	0.3462	0.4267	0.3730	0.3548	0.3940
Tenure_4	0.2187	0.2275	0.2088	0.2269	0.2274	0.2263
Tenure_5	0.2956	0.3219	0.2658	0.2871	0.3014	0.2706
Log(Hours)	3.68	3.70	3.65	3.69	3.70	3.67
	(0.29)	(0.29)	(0.28)	(0.25)	(0.24)	(0.26)
Private Sector§	0.5559	0.5180	0.5988	0.6131	0.5932	0.6361
Government	0.1800	0.1700	0.1914	0.2048	0.1712	0.2437
Self-employed	0.2641	0.3121	0.2098	0.1821	0.2356	0.1203
Agriculture	0.2125	0.2617	0.1568	0.1557	0.2055	0.0981
Manufacturing§	0.1351	0.0818	0.1955	0.0778	0.0589	0.0997
Utility	0.0124	0.0207	0.0031	0.0088	0.0137	0.0032
Construction	0.0888	0.1547	0.0143	0.0954	0.1671	0.0127
Retail	0.1232	0.1061	0.1426	0.1549	0.1247	0.1899
Hotels	0.1003	0.0854	0.1171	0.1278	0.1068	0.1519
Transport	0.0640	0.0962	0.0275	0.0521	0.0685	0.0332
Finance	0.0454	0.0486	0.0418	0.0734	0.0699	0.0775
Public Administration	0.1428	0.1241	0.1640	0.1601	0.1329	0.1915
Social Services	0.0415	0.0144	0.0723	0.0580	0.0425	0.0759
Domestic Services	0.0339	0.0063	0.0652	0.0360	0.0096	0.0665
Castries City	0.0707	0.0728	0.0682	0.0925	0.0877	0.0981
Castries Rural§	0.3052	0.2752	0.3391	0.3443	0.3356	0.3544
Anse LaRaye	0.0521	0.0585	0.0448	0.0455	0.0479	0.0427
Soufriere	0.0530	0.0549	0.0509	0.0756	0.0767	0.0744
Choiseul	0.0511	0.0486	0.0540	0.0316	0.0342	0.0285
Labourie	0.0597	0.0755	0.0418	0.0330	0.0288	0.0380
Vieux-Fort	0.0922	0.1034	0.0794	0.0529	0.0507	0.0554
Micoud	0.0888	0.1052	0.0703	0.1505	0.1712	0.1266
Dennery	0.1299	0.1097	0.1527	0.0786	0.0740	0.0839
Gros Islet	0.0974	0.0962	0.0988	0.0954	0.0932	0.0981
Round_1§	0.5282	0.4640	0.4807	0.3349	0.3438	0.3244
Round_2	0.4718	0.5360	0.5193	0.2606	0.2589	0.2627
Round_3	†	†	†	0.1314	0.1342	0.1282
Round_4	†	†	†	0.2731	0.2630	0.2848
Sample Size	2094	1112	982	1362	730	632

Notes:

(a) § denotes the base group in regression estimation.

(b) The standard deviations are reported in parentheses for continuous variables.

(c) The 'Other Education' is comprised of basic skills training programs.

(d) 'Tertiary' education constitutes the level between secondary and university education. It comprises academic preparation for the advanced level examinations and certificate level technical skills training.

(e) Round 1 and Round 2 in 1996 are January to June and July to December, respectively. Rounds 1 to 4 in 2004 are as follows: January to March, April to June, July to September and October to December.

(f) † denotes not applicable in estimation.

(g) See Table A.3.2 of the Appendix for variable description.

Table A.3.2 provides a description of the variables used in the analysis and table 3.4 reports summary statistics. The summary statistics in table 3.4 reveals that the private sector is the largest employment sector for more than one-half of employed individuals, increasing from 55.6 percent in 1996 to over 61 percent in 2004. Government sector employment has also risen between these two time periods but by a more modest amount. The self-employed accounted for about one-quarter of those employed in 1996 but this contracted to 18.2 percent by 2004.

In 1996, about one-fifth of those employed were in the agricultural sector but by 2004 this declined to about 16 percent, in line with the contraction in banana production, resulting from the loss in preferential access to European Union (EU) markets. Generally more males (about one-quarter) than females (15.6 percent) are employed in the agricultural sector. The manufacturing sector over the two time periods is faced with high energy costs, stiff regional competition and problems with transportation logistics and as a result the levels of employment in the industry contracted over time (see Government of St.Lucia 2004a). The share of female employment in the manufacturing sector in 2004 is about one-half of the 1996 level, moving from 19.6 percent to 10.0 percent. There have been noticeable increases in the proportion of those employed in the retail, hotels and finance sectors. Thus, there is some evidence of change over time in the employment activity of St.Lucians and the industries within which they are employed. The preceding temporal shifts in employment mirrors the gradual reorientation of the island's economy to a services based economy. The data are classified within eleven industry groups, in line with the ILO ISIC Rev 3.1 at the one-digit industry level.

The formal educational system in St. Lucia consists of three tiers: primary, secondary and tertiary. Primary schooling consists of seven years, followed by five years of secondary education. Appropriately qualified students can progress, if accepted, to the tertiary or university level for two and three years respectively. On average, over one-half of respondents in both survey years reported primary education as their highest educational attainment (see table 3.4). A significant proportion of the primary educated cohort are not labour market participants, this means that they are either unemployed or are entirely out of the labour force. The nature of the primary curricula in the Eastern

Caribbean is designed to impart knowledge to succeed at the common entrance examinations. The common entrance examinations are completed at the end of primary school and are a means to select students into the secondary level. This form of selection was necessary, as St. Lucia only attained universal secondary education in 2005 and secondary school places then were supply constrained. Now although universal secondary education has been attained the common entrance examination is still administered as a means of selecting students into schools by district and according to placement scores.

The incidence of high levels of primary educational attainment may be linked to the islands agricultural past, with a multitude of unskilled jobs in the sector with low demands for educational competence. The challenges of low productivity, skills mismatch and age-specific unemployment cited in the literature (see World Bank 2005a, 2005b; ECLAC 2005) may in fact be attributable to the structure of the educational system supplying a large primary educated pool of workers to the labour market. In both years more males than females are in possession of primary education.

About one-quarter of the sample have completed secondary education and about 15 percent have acquired post- secondary qualifications.[5] In both years more females compared to males are in possession of secondary and post-secondary education. Available evidence from the World Bank (2005b) points to the existence of a male disadvantage in enrolment at the secondary level in Caribbean countries and the evidence in both the St. Lucia and Dominica LFS substantiate this finding. The analysis of the gender pay gap in the country specific chapters will determine if the higher educational attainment for females is reflected in their earnings in the labour market.

The average age of the St.Lucia sample in 1996 is 35 years, with the age for females being slightly lower. In 2004, the sample age increases to 37 years with the average age of females once again being lower than the sample age of males. About one-half of the employed have held their jobs for five years or more in both years. In both periods, males register higher levels of employment experiences than their female counterparts. However, by 2004 a slight increase in female job tenure is detected, with a corresponding decrease in male job tenure in 2004 as compared to 1996.

Section 3: Barbados Data Description

The data used in the analysis of the labour market themes in this chapter for Barbados is the Continuous Labour Force Sample Survey (CLFSS) data for the years 1999 and 2003. The CLFSS is conducted on a quarterly basis. The CLFSS uses a sample of approximately 2 percent of households in Barbados. The sample design assigns the eleven parishes into four strata, with the conflation of the parishes within each stratum being similar along social and economic lines and geographical proximity. The survey employs a multi-stage design. Stage one is the enumeration district and stage two is at the household level.

The CLFSS includes the population aged 15 years and older, who are employed, unemployed or inactive, but excludes visitors and persons in institutions. The CLFSS questions individuals on their age, gender, strata (i.e., residential location), relationship to head of household and educational attainment. It has a similar structure to the surveys in Dominica and St. Lucia, and the CLFSS has a question to elicit labour force activity (i.e., employed, unemployed or not in the labour force). The employed respondents are asked questions on employment attachment including labour market earnings and number of hours worked in the reference week, employment status (i.e., government, private sector or self-employed), job tenure and industry attachment. The CLFSS is undertaken by the Barbados Statistical Service Department since 1975 and the data are of relatively high quality as technical assistance was provided by the United Nations Development Programme (UNDP). In 2003, a review of the CLFSS was undertaken with assistance from the ILO to enhance the usefulness of the data.

In Barbados, unlike Dominica and St.Lucia, respondents are questioned on weekly earnings rather than monthly earnings. However, the respondents similarly specify their earnings and the interviewer directly assigns the earnings to the respective interval category. There are nine (in 1999) and eleven (in 2003) mutually exclusive interval-coded categories for the distribution of weekly earnings in Barbados. The modelling of the earnings data thus requires the use of an interval regression model as in the case of Dominica and St. Lucia. The weekly earnings intervals and the corresponding frequencies are detailed in table 3.5. The density distribution for hourly earnings and hours are shown in graphs A.3.19 – A.3.30. In Barbados as compared to Dominica and

St.Lucia there are a number of peaks in the density of ln(hourly wages) and this is expected given the size of the sample. The hours of work in Barbados again indicate hours clustered around 40 – 45 hours, pointing to the low incidence of part-time work as a feature of the Barbados labour market.

Table 3.5. Barbados Frequency of Weekly Earnings by Gender Category (in percent)

Earnings Interval (BD$)	1999			2003		
	All	Male	Female	All	Male	Female
$0 - $200	0	0	0	8.7	4.7	13.1
$200 - $299	39.2	29.7	50.1	20.2	14.6	26.2
$300 - $399	22.7	27.1	17.8	23.8	26.5	20.9
$400 - $499	13.2	15.7	10.4	16.3	19.6	12.7
$500- $599	7.6	9.0	6.1	11.0	13.3	8.5
$600 - $699	3.7	3.7	3.7	5.5	6.1	4.8
$700 -$799	2.3	2.2	2.5	4.3	4.6	3.9
$800 - $899	6.0	6.5	5.4	2.9	2.2	3.5
$900 - $999	5.2	6.3	4.0	1.2	1.2	1.2
$1000 - $ 1300	†	†	†	4.0	4.3	3.7
$1300 and over	†	†	†	2.2	2.9	1.5
Sample size	7478	3971	3507	8603	4454	4149

Notes:
(a) US$1.00 = BD$2.00
(b) † not applicable

In terms of final data issues, as regards inflation and part-time work; inflation is not a major problem in the Eastern Caribbean countries. Inflation rates in non-crisis and non-recessionary period averages well below 3 percent per annum. The relevant Inflation rates for the countries are as follows: Dominica 1.68 percent in 1999; Barbados, 2.39 in 1999 and 1.62 percent in 2003; St. Lucia 0.93 percent in 1996 and 1.46 percent in 2004 (see IMF 2009). In addition, part-time work is not a feature of the labour markets in the selected countries in the thesis. Hence no special attention is paid to these two issues in the thesis.

The analysis covers individuals between the ages of 15 to 64 years and the primary focus is on the factors affecting earnings in the main job. The description of variables is given in Table A.3.3 of the appendix and the summary statistics are presented in table 3.6. In 1999, the average age of individuals in the full sample is 37.4 years, with very little variation in age by gender; the only notable difference is a slightly higher age of the females in the sample. In 2003, the average age of the full employed sample increases to 39.1 years, and again the disparity in age due to gender is modest. In 1999,

males comprise 53.1 percent of the employed sample contracting to 51.7 percent in 2003.

Table 3.6. Barbados Summary Statistics for those in Employment

Variables	1999 Mean Values			2003 Mean Values		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Age (years)	37.3625	37.2340	37.5081	39.1173	39.0604	39.1784
	(11.4077)	(11.6719)	(11.1009)	(11.3619)	(11.6686)	(11.0241)
Male	0.5310	†	†	0.5177	†	†
Primary§	0.2045	0.2274	0.1785	0.1452	0.1593	0.1282
Secondary	0.6273	0.6160	0.6401	0.6015	0.6037	0.5992
Technical vocational	0.0270	0.0337	0.0194	0.0550	0.0790	0.0311
University	0.1375	0.1196	0.1577	0.1928	0.1515	0.2372
Other Education	0.0029	0.0023	0.0037	0.0055	0.0065	0.0043
Tenure_1§	0.1095	0.0970	0.1238	0.0964	0.0821	0.1116
Tenure_2	0.3798	0.3485	0.4152	0.3599	0.3341	0.3876
Tenure_3	0.1871	0.1914	0.1822	0.2049	0.2032	0.2068
Tenure_4	0.1055	0.1146	0.0952	0.1107	0.1224	0.0981
Tenure_5	0.0907	0.0992	0.0810	0.0690	0.0790	0.0583
Tenure_6	0.1274	0.1493	0.1027	0.1591	0.1792	0.1376
Log(Hours)	3.6874	3.7100	3.6617	3.6830	3.6935	3.6718
	(0.2495)	(0.2152)	(0.2811)	(0.2608)	(0.2643)	(0.2565)
Private Sector§	0.6323	0.6034	0.6650	0.6335	0.5990	0.6705
Government	0.2320	0.2209	0.2447	0.2298	0.2140	0.2468
Self-employed	0.1357	0.1758	0.0904	0.1367	0.1870	0.0827
Agriculture	0.0411	0.0499	0.0311	0.0421	0.0489	0.0347
Manufacturing§	0.0841	0.0816	0.0870	0.0627	0.0617	0.0638
Utility	0.0162	0.0209	0.0108	0.0205	0.0211	0.0198
Construction	0.1153	0.2040	0.0148	0.0960	0.1758	0.0104
Retail	0.1411	0.1095	0.1768	0.1525	0.1260	0.1810
Hotels	0.1026	0.0806	0.1275	0.1100	0.0938	0.1273
Transport	0.0377	0.0519	0.0217	0.0373	0.0510	0.0227
Finance	0.0582	0.0395	0.0793	0.0703	0.0465	0.0959
General Services	0.1910	0.1690	0.2159	0.1945	0.1805	0.2094
Public Administration	0.2129	0.1932	0.2352	0.2141	0.1947	0.2350
Stratum1§	0.3423	0.3488	0.3350	0.3418	0.3352	0.3490
Stratum2	0.2772	0.2647	0.2914	0.2890	0.2901	0.2878
Stratum3	0.1900	0.1916	0.1882	0.2169	0.2124	0.2217
Stratum4	0.1904	0.1949	0.1853	0.1523	0.1623	0.1415
Sample Size	7478	3971	3507	8603	4454	4149

Notes:
(a) § denotes the base group in regression estimation.
(b) The standard deviations are reported in parentheses for continuous variables.
(c) † denotes not applicable in estimation.
(d) See Table A.3.3 of the Appendix for variable description.

The group reporting primary education as the highest attainment in 1999 is small at one-fifth of the employed, in comparison to Dominica (57.8 percent in 1999) and St. Lucia (56.0 percent in 1996). In terms of gender, more males (22.7 percent) than females (17.9 percent) are in possession of terminal primary education. The attainment of secondary education is the dominant educational level for an estimated three-fifths of the Barbadian population. At the secondary level, a slightly larger proportion of females (64 percent) than males (61.6 percent) hold secondary qualifications in 1999.

An estimated 13.8 percent of the employed has university qualifications, with females again outpacing males in university level attainment. In 2003, the number of individuals claiming primary education as the highest educational level narrows.

The number of individuals with terminal secondary education also recorded a contraction, while individuals with technical and vocational (5.5 percent) and university (19.3 percent) level education expands. In terms of gender, males comprise the larger group holding primary and technical vocational educational attainment, while more females are educated to the secondary and university levels.

The educational system in Barbados is uniquely different from the systems in the other Eastern Caribbean countries. Barbados has a mature educational system that dates back to 1686 (see Government of Barbados 2000). In the last decade the Government of Barbados developed and implemented a well-articulated strategic vision for education and manpower development, termed the White Paper on Education Reform of 1995. The number of university graduates is higher in Barbados as compared to the other countries in the thesis and there are two main reasons. First, the Cave Hill campus of the University of the West Indies is based in Barbados, and second, the government recognises the importance of education to economic development. In Barbados university students' enrolment is heavily subsided to the point of being almost free. Dominica and St. Lucia are not fortunate to offer secondary students parallel access to university education as the financial resources and physical university plant are not available. Thus, Barbados has an unprecedented advantage over the other countries in this study in terms of educational access and cost savings accruing to students.

The private sector is the employment sector for an estimated three-fifths of the employed and the government (or public) sector accounts for about one-fifth of those in employment. In both the private and government sectors females form the larger gender group. The self-employed sector is the smallest and accounts for an estimated 13.6 percent in both years. Males outnumber females by almost two-to-one in the self-employment sector. The concentration of males in self-employment is not peculiar to Barbados as this is similarly the case in Dominica and St. Lucia. The composition of employment in the private, government and self-employment sectors is stable over time with hardly any variation in employment attachment to the different sectors.

The educational attainment of the employed group by employment sector suggests university educated individuals select into public sector employment. In 1999, for example, about one quarter of employees in the public sector is in possession of university degrees compared to the private sector (about 10 percent). By 2003, about one-third of public sector employees hold university degrees in comparison to the private sector (15.5 percent) and the self-employment sector (14.5 percent).

About one-third of the employed has employment experience of eleven years or more in both 1999 and 2003. The CLFSS assigns the eleven districts (or parishes) into four strata. The eleven parishes are divided into four strata according to socio-economic development; Stratum one (St. Michael, includes the capital city -Bridgetown); Stratum two (Christ Church, St. Phillip); Stratum three (St. George, St. James, St. Thomas); Stratum four (St. John, St. Joseph, St. Andrews, St. Peter, St. Lucy).

Stratum one has the largest population in both years, about one-third of the employed sample. The capital city Bridgetown is located in stratum one and the sample size is the largest, as segments of the population congregate in and around the city centre to be in close proximity to jobs and social and economic services. Stratum two is the second largest and it is comprised of suburban areas with a great proportion of middle-income households. In addition, stratum two has a large proportion of hotels and other commercial establishments thus being host to a set of diverse employment opportunities. The two remaining stratums contain eight parishes and as they are mainly rural parishes, the sample sizes are markedly smaller; jointly stratum three and four account for an estimated 38 percent of the employed in 1999 and 2003. In 2003, the employed in stratum four contracts while there is a corresponding increase in the number of employed respondents in stratum three, thus leading to the maintenance of the overall sample size in stratum three and four over the two time periods.

Public administration is the industry affiliation of an estimated one-fifth of the respondents in 1999 and remains the same in 2003. Over time a small change is observed in the industry attachment of the employed. The second largest employment sector accounting for about one-fifth of the employed cohort in both years is general services. In addition, the average industry attachment in agriculture (4.2 percent) and

transportation (3.7 percent) reflects marginal temporal changes. Meanwhile, employment in the hotel sector also grew marginally as a share to 11.0 percent in 2003, from 10.2 percent in 1999. The employment levels in the financial and international business sector increases to 7.0 percent in 2003, up from 5.8 percent in 1999. The expansion in the hotels and financial services sector is in line with the government's initiatives to diversify and broaden the economic base and reduce the country's exposure and vulnerability to external shocks. The utility, retail, and finance sectors register growth in employment shares in 2003 compared to 1999. The employment share in the construction sector declines from 11.5 percent in 1999 to 9.6 percent in 2003. In terms of gender, females shows a propensity to concentrate in retail, hotel, public administration, general services, and finance sectors indicating a gender bias in industrial concentration. The data also provide evidence of male dominated industries (construction, transport, and agriculture). The summary statistics on tenure, employment sector and industry affiliation reveal stability with little variation for those employment shares over the two time periods.

The final samples for the employed sub-sample contain 7,478 and 8,603 observations in 1999 and 2003, respectively. Table 3.7 provides an overview of the LFS sample sizes for the selected countries. Table 3.8 details the attrition in the data during the cleaning process. As observed an estimated three-quarter of the reduction in the sample is on account of the sample falling outside the 15 – 64 age groups. The remainder of the loss in the data is due to missing values in key variables. The incidence of 'not stated' and 'do not know' as responses are expected and may be genuine amnesia or a means to safeguard confidentiality. In addition, a few of the missing values are attributed to human error in the data inputting process. The data losses have not compromised the quality of the final datasets.

Table 3.7. Labour Force Survey sample sizes for the selected countries

Country	Survey Year	Survey Sample Size	Number of Observations 1/
Barbados	1999	13,576	7478
	2003	15049	8603
Dominica	1999	3584	1138
St. Lucia	1996	Round 1: 5256	2094
		Round 2: 5547	
	2004	Round 1: 2618	1362
		Round 2: 2255	
		Round 3: 1176	
		Round 4: 2374	

Source: Labour Force Surveys of selected Caribbean countries.
Notes:
(a). 1/ Employed workers aged 15-64 years, after data cleaning to eliminate observations with incomplete data
(b). The Barbados samples are done quarterly, however the Government of Barbados conflates the samples and disseminates as an annual data set, for reasons of data confidentiality.
(c). The Dominica survey is an annual sample.
(d). The St. Lucia 1996 data are from bi-annual surveys and the 2004 data are from quarterly surveys.
(e). Data are for individual level observations.

Table 3.7. Summary of Attrition in Labour Force Survey Data

	Original Sample	Drops due to:			Final Sample
		Age (outside 15- 64 years)	'Missing Values' in Key Variables	'Not Stated' in Key Variables	
Barbados					
2003	16463	2290	1414	425	12334
1999	13576	2131	187	579	10679
St. Lucia					
1996	10803	5809	863	137	3994
2004	8423	3264	1590	220	3349
Dominica					
1999	3583	1476	27	160	1920

Source: Labour Force Surveys

The composition of the data used in the econometric estimations is outlined in table 3.9. The details of the econometric methodology are presented in the following chapter 4, however it is worth noting that in the various steps of the estimation, the sample utilises the employed, unemployed and not in the labour force samples to derive the pertinent results.

Table 3.9. Labour Force Survey Final Sample by Major Activity
(number of observations)

	Barbados		Dominica	St.Lucia	
	1999	**2003**	**1999**	**1996**	**2004**
Employed	7478	8603	1138	2094	1362
Unemployed	932	1137	260	516	950
Not in Labour Force	2269	2494	522	1384	1037
Total Sample	**10679**	**12234**	**1920**	**3994**	**3349**

ENDNOTES

[1] See Government of Dominica (1999) for more details on the island's Labour Force Survey.
[2] See the St.Lucia Labour Force Survey at http://www.stats.gov.lc/main3.htm.
[3] In cases where the sample does not contain information on actual experience, potential experience is used as a proxy. Potential experience is computed as age – schooling –age started school (Mincer, 1974).
[4] The United Nations Convention on the Rights on the Child, article 28 (1989) explicitly recommends that '*states make primary education compulsory and free*'. St. Lucia as a party to the Convention has set the compulsory school attendance age from 5-15 years to correspond with the duration of primary education. Effectively the age of entry into the labour force is set at the cusp of 15-16 years. The National Insurance Scheme has set the pension age at 62 years.
[5]In St. Lucia and Dominica the tertiary tier is the highest educational level available locally. To pursue university education students could enrol at one of the regional University of the West Indies (UWI) campuses or an extra-regional university. The UWI campuses are Cave Hill campus in Barbados, Mona campus in Jamaica and St. Augustine in Jamaica. Students in non-campus islands can now complete the first two years of the three-year undergraduate degree programme in a limited range of social science subjects. Students who wish to pursue studies in engineering, medicine and law must enrol in one of the three campuses from year one as instruction for those are not available at the satellite sites. Apart from this arrangement with the UWI, other options for higher education may be pursued through physical enrolment at institutions outside of the Eastern Caribbean region. Increasingly, however, with the advent of distance programmes many individuals are using that avenue as a means of acquiring higher education qualifications. The growth in the university educated cohort continues to exhibit slow growth as investment in higher education is mainly self-financed and hence expensive.

CHAPTER 4: ECONOMETRIC METHODOLOGY

The econometric methodology used is the same for the three countries in the study, as in each case the dependent variable on earnings is interval coded in nature. However, the number of intervals and the spread of earnings within each interval vary and within the methodology these are clearly specified. The chapter provides a full description of the methodology for Dominica and where appropriate, pertinent explanations are introduced for Barbados and St.Lucia. The discourse firstly defines the basic econometric model, and subsequently builds upon this model to derive equations to estimate the rates of return to education, the inter-industry wage structure, gender pay gap, and public sector pay premium.

The Econometric Estimation Procedure

The LFS earnings data for Dominica are interval-coded across thirteen mutually exclusive categories. The first interval has a cut-off point at 99 dollars[1] gross per month with subsequent cut-off points at 299, 499, up to a final category at 3,999 dollars. The LFS earnings data for St. Lucia are interval-coded across eight mutually exclusive categories for both time periods. The first interval has a cut-off point at 200 dollars gross per month and the final cut-off point is at 5,999 dollars. The LFS earnings data for Barbados are interval-coded across nine and eleven mutually exclusive categories in 1999 and 2003, respectively. In both years the first interval has a cut-off point at 199 dollars[2] gross per week, with subsequent cut-off points at 399, 599 up to a final category at 899 dollars in 1999 and 1,299 dollars in 2003.

The use of ordinary least squares (OLS) in this context would require assigning mid-point values, suitably log transformed in the Mincerian tradition, to observations within the thirteen separate categories as in the case for the Dominica data. This is an *ad hoc* procedure that is rendered more problematical when open-ended categories are present, as in this case, and is not one that generally results in econometrically consistent estimates (see Stewart 1983). Monte Carlo evidence suggests that OLS estimation

using such mid-points may result in negligible information loss provided interval widths are small relative to the standard error of the regression (see Caudill 1992).[3]

The interval-coded nature of the responses for the dependent variable requires a more apposite procedure and this is provided by use of maximum likelihood techniques. The potential problem posed by the presence of interval-coded data on the dependent variable motivated Stewart (1983) to develop a customized likelihood function that allowed for efficient and consistent parameter estimation given standard assumptions relating to the error structure in the underlying latent dependent variable model. The likelihood function is a modification of that used by McKelvey and Zavoina (1975) for the ordered probit model but with the unknown threshold values replaced by a set of known values delineating the category intervals and the parameter for the error variance estimated freely rather than constrained to unity.

The ensuing definition of the intervals explains the 1999 Dominica LFS sample. Similarly the adjustments for the St. Lucia LFS could be made seamlessly to describe the maximum likelihood techniques for the eight earning categories in the 1996 and 2004 samples or the nine and eleven categories in the Barbados samples. Thus, for the Dominica LFS, let y_i denote the observable ordinal variable, coded 1, 2,…..,13 reflecting the thirteen distinct monthly earnings categories in the application, and let y_i^* describe an underlying latent variable that captures the earnings of the i^{th} individual. This can be expressed as a linear function of a vector of the relevant explanatory variables ($\mathbf{X}_i$) using the following relationship:

$$y_i^* = \mathbf{X}_i'\boldsymbol{\beta} + u_i \qquad \text{where } u_i \sim N(0, \sigma^2) \qquad [1]$$

It is assumed that y_i^* is related to the observable ordinal variable y_i as follows:

$y_i = 1$ if $-\infty < y_i^* \leq a_1$

$y_i = 2$ if $a_1 < y_i^* \leq a_2$

. . . . .

. . . . .

$y_i = 12$ if $a_{11} < y_i^* \leq a_{12}$

$y_i = 13$ if $a_{12} < y_i^* < +\infty$

where the a_j for j=1,…13 denote the interval boundaries. Following Stewart (1983), the first and the last intervals are treated as open-ended. This implies that for j=1, $\Phi(a_j) = \Phi(-\infty) = 0$ and for j=13, $\Phi(a_j) = \Phi(+\infty) = 1$, and $\Phi(\cdot)$ denotes the cumulative distribution function operator for the standard normal.

The exact knowledge of the thresholds allows the likelihood function to be specified. The variable y_i^* is best interpreted not as a latent measure but one with a quantitative interpretation. In implementing the procedure the standard normal assumption conventionally invoked for the ordered probit model is replaced by the assumption that $y_i^* | \mathbf{X}_i \sim N(\mathbf{X}_i'\boldsymbol{\beta}, \sigma^2)$. This then allows specification of the log likelihood function as follows:

$$L = \sum_{i=i}^{n} \sum_{j=1}^{J} \delta_{ij} \log_e[\Phi(\frac{a_j - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma}) - \Phi(\frac{a_{j-1} - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma})] \qquad [2]$$

where δ_{ij} =1 if the i^{th} individual falls within the j^{th} earnings category and 0 otherwise, and $\log_e(\cdot)$ denotes the natural logarithmic operator. The maximum likelihood procedure involves the estimation of the $\boldsymbol{\beta}$ parameter vector and the ancillary parameter σ, the standard error of the regression model. Given the introduction of the known thresholds fixes the scale of the dependent variable, the estimated coefficients are amenable to a direct OLS-type interpretation. Since there are strong theoretical priors for estimating a log earnings equation compatible with Mincerian theorizing, the known threshold values used in specifying the log-likelihood function [2] are based on the natural logarithms of the reported thresholds. Thus, in the context of the Dominica specification, $a_1 = \log_e(99)$, $a_2 = \log_e(299)$ and so forth to $a_{12} = \log_e(3{,}999)$.

The standard variance-covariance matrix for this estimator is given by the inverse of the information matrix (i.e., $[I(\hat{\boldsymbol{\beta}})]^{-1}$) computed at the maximum likelihood (ML) estimates for these parameters where the 'hat' denotes the ML estimator. However, the Huber (1967) 'sandwich' estimator, which provides an appropriate asymptotic matrix for an estimator that is potentially biased in an unknown direction, is used in the current application. This is defined as:

$$\text{Var-Cov}(\hat{\boldsymbol{\beta}}) = [I(\hat{\boldsymbol{\beta}})]^{-1}(\mathbf{X}_i' \hat{\Omega} \mathbf{X}_i) [I(\hat{\boldsymbol{\beta}})]^{-1} \quad [3]$$

where $\hat{\Omega}$ is the n×n matrix with the squared values for the interval regression model's pseudo-residuals along its diagonal and zeroes for all off-diagonal elements. The pseudo-residual for the i^{th} individual for the interval regression model is defined as:

$$u_i = \frac{\phi\left(\frac{a_{j-1} - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma}\right) - \phi\left(\frac{a_j - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma}\right)}{\sigma\left[\Phi\left(\frac{a_j - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma}\right) - \Phi\left(\frac{a_{j-1} - \mathbf{X}_i'\boldsymbol{\beta}}{\sigma}\right)\right]} \quad [4]$$

where $\phi(\cdot)$ denotes probability density function operator for the standard normal.

The use of top-coding for the robustness of interval regression results has not been pursued here as the literature advises against this due to the potential bias introduced through top-coding (see for example Manski and Tamer 2002; Rigobon and Stoker 2007). The use of IRM adequately controls for such bias. The use of OLS would require particular attention to censoring and hence the reason for using IRM over OLS given interval coded nature of the dependent variable.

The remaining econometric methodology is applicable to all the countries, however, in the computation of the rates of returns the reference group for the Barbados calculations differs from that of Dominica and St. Lucia and this is explained below.[4]

The Mincerian Equation and the Rate of Return to Education

The estimation of the earnings equation permits, among other things, the computation of annualized private rates of return to education. Although a 'years-in-schooling' measure was originally suggested by theory (see Mincer 1974), it has become more conventional to empirically formulate the schooling variable through use of mutually exclusive binary measures capturing the highest educational level attained by an individual. Assume there are r educational levels, the annualized rate of return to the r^{th} educational level (ROR_r) can be computed as:

$$ROR_r = [\beta_r - \beta_{r-1}] \times [r_{years}]^{-1} \quad [5]$$

where β_r denotes the parameter corresponding to the r^{th} educational level; β_{r-1} denotes the parameter for one below the r^{th} level; and r_{years} denotes the total number of years taken to complete the r^{th} educational level. Thus to illustrate, the private rate of return to primary, secondary, tertiary and university education are computed as below:

$$\text{Primary education} = ROR_{prim} = [\beta_{prim}] \times [r_{years\_prim}]^{-1} \quad [5']$$

The rate of return to secondary education is computed using the estimated coefficients for secondary and primary education. This is computed as:

$$\text{Secondary education} = ROR_{sec} = [\beta_{sec} - \beta_{prim}] \times [r_{years\_sec}]^{-1} \quad [5'']$$

The same procedure is followed for tertiary and university education, in the case of tertiary education the next lower level is secondary. Tertiary education is regarded as a preparatory step beyond secondary education that improves the prospects for university education or alternatively labour market attachment. The rate of returns to tertiary education is derived as:

$$\text{Tertiary education} = ROR_{ter} = [\beta_{ter} - \beta_{sec}] \times [r_{years\_ter}]^{-1} \quad [5''']$$

Due to the intermediate nature of tertiary education and the fact that not all university graduates may have necessarily completed tertiary education, university education is compared with the secondary level. The rate of return to university education is computed as:

University education = $ROR_{univ} = [\beta_{univ} - \beta_{sec}] \times [r_{years\_univ}]^{-1}$ [5""]

In all the selected countries the different educational levels are as follows: primary (prim) = 7 years, secondary (sec) = 5 years, tertiary (ter) = 2 years, and university (univ) = 3 years.

Given regression estimates and corresponding variances and covariance terms for the βs, the sampling variance for the ROR_r point estimate is a linear expression and can be computed in a straight-forward manner. For example, for the rate of return to a university degree this variance is defined as:

$$\left(\frac{1}{r_{years}}\right)^2 * \left[Var\left(\hat{\beta}_{univ}\right) + Var\left(\hat{\beta}_{\sec}\right) - 2Cov\left(\hat{\beta}_{univ}, \hat{\beta}_{\sec}\right)\right] \quad [6]$$

The empirical approach to estimating rates of return to education outlined here is potentially constrained to some extent by a failure to control for innate ability. It is well established that if ability is correlated with both the level of education and labour market earning, the conventional rate of return estimates based on OLS (or an equivalent procedure) exhibit an upward bias. Though there is a consensus about the direction of the bias, there is less of one on its magnitude. The evidence cited in Card (1999) suggests that the extent of the bias may be modest in nature. The dataset, like all others derived from a standard LFS, contains little information that could be used to proxy for ability in a meaningful sense, and the estimated rates of return thus remain subject to a caveat in this regard.

In Barbados, unlike Dominica and St. Lucia, there are few individuals in the sample with less than primary education, and the base group in the regression model is thus primary education. The end result is an estimation of rates of return to education for secondary and university education in Barbados. Table A.4.1 outlines the structure of national educational systems in selected Caribbean countries.

Investigation of the Inter-industry Wage Structure

The augmentation of the Mincerian equation through the inclusion of controls to capture location, employment sector and industry branch allows for the investigation of other labour market themes. In particular, the augmentation allows for exploiting this framework to investigate the industry wage structure and the magnitude of inter-industry wage differentials within the labour markets of the selected countries. The earnings equation is expressed as:

$$w_i = X_i'\boldsymbol{\beta} + \delta G_i + \mathbf{M}_i'\boldsymbol{\gamma} + v_i \qquad \text{where } i=1,\ldots\ldots, n \qquad [7]$$

where $\mathbf{M}$ denotes a m×n matrix of variables capturing, *inter alia*, industry effects, G denotes the gender effects, to equal one for male and zero otherwise and v_i is the error term for the i^{th} individual. Assume there are i=1, ….., p industries.

The estimated industry effects can be interrogated by normalizing their effects as a deviation from an overall industry weighted average. This transformation has appeal in that the estimated earnings differences are then expressed relative to an overall average rather than the arbitrary base group used in estimation, and are thus more easily interpretable (see Krueger and Summers 1988; Haisken-DeNew and Schmidt 1997; Zanchi 1998).

If the industry earnings effect for the k^{th} industry is defined as γ_k, the deviation is expressed as:

$$D_k = \gamma_k - \sum_{i=1}^{p} \pi_i \gamma_i \qquad [8]$$

where π_i is the proportion of the sample of individuals in the i^{th} industry. The sampling variances are computed using the approach suggested by Zanchi (1998):

$$V(\mathbf{D}) = (I - e\pi')V(\gamma)(I - e\pi')' \qquad [9]$$

where V(**D**) represents the variance-covariance matrix for the deviations from the average expressed in [8], I is a (p×p) identity matrix; e is a (p×1) vector of ones; π is a (p×1) vector with elements comprising the sample proportions for the p industry groups; and $V(\gamma)$ is the (p×p) estimated robust variance-covariance matrix for the γ_j industry coefficients suitably modified to cater for the zero coefficient corresponding to the industry base category.

Two measures of overall variability in the inter-industry wage structure are also calculated. The first is based on Krueger et al. (1988) and the second exploits the refinement suggested by Haisken-DeNew et al. (1997). The former is computed as the square root of the weighted squared standard deviations based on [8] above with weights provided by the industry sample proportions. The latter is computed as the square root of the weighted adjusted standard deviations in [8] with an adjustment introduced to correct for the sampling errors associated with using estimated coefficients. The industries in the LFS are coded using the ISIC revision 3.1 at the one-digit industry level.

The Gender Pay Gap and the Public Sector Pay Premium

The versatility of the basic Mincerian earning equation is further explored to estimate the gender pay gap. Following Mincer's (1974) seminal theoretical contribution on human capital and earnings, it has become conventional to specify labour market earnings in their logarithmic form, as an austere function of human capital variables capturing educational attainment and labour force experience. This relationship can be conveyed by equation [7] that allows an intercept shift for gender.

The approach adopted here to quantify the gender gap and the public sector premium uses intercept shifts rather than data separation. In order to obtain the raw pay gap an interval regression model is estimated as a function of a constant and the gender dummy (G_i) only. This gives the raw gender pay gap, which is then compared to the *ceteris paribus* pay gap estimated using expression [7].

The public sector pay premium is obtained in a similar way. This involves firstly regressing the dependent variable on a constant, the public sector dummy (Pub_i) and the self-employment dummy (SE_i). The estimated coefficient on Pub_i yields the raw public sector pay premium, which is compared to the *ceteris paribus* estimated using expression [7].

The augmented Mincerian framework has been exploited in the earnings decomposition analysis originally suggested in the seminal work of Oaxaca (1973) and Blinder (1973), and used to assess the magnitude of unequal labour market treatment in regard to the ethnic or gender characteristics of workers. The conventional approach has been to separate the data points on the basis of the immutable attribute of interest and perform separate earnings regressions. The fact that this approach is routinely practised in the literature without determining whether the data statistically support such separation is something of a puzzle. Such an approach has a tendency to over-parameterize the relationships of interest and a more efficient procedure is to retain the statistically significant interaction terms within a regression model that pools the data across the group attribute of interest. This has some merit in applications where degrees of freedom are tight, as in the current case.

Thus, in determining the magnitude of the gender pay gap and the public sector premium, we simply use in the first instance, intercept shifts. The standard decomposition methodologies used by Oaxaca (1973) and Blinder (1973) exploit OLS mean regression properties, which are not readily exploitable, given the use here of maximum likelihood procedures. In addition, these approaches also require sample separation that reduces sample sizes dramatically. For both these reasons, the Oaxaca-type approach is avoided here.

Goodness-of-fit Measures

A number of goodness-of-fit measures can be computed for the interval regression model including a pseudo-R^2 based on the comparison of restricted and unrestricted log-likelihood values. The McFadden R^2 is one such goodness-of fit-measure and is defined as:

$$\text{McFadden } R^2 = 1 - \frac{\ln \hat{L}_{full}}{\ln \hat{L}_{intercept}} \qquad [10]$$

In expression [10], the numerator is the log likelihood of the full model containing all explanatory variables and the denominator contains only the constant term. The goodness-of-fit measure preferred in this study, however, is defined as:

$$\text{Adjusted–}R^2 = 1 - \frac{\sigma^2_{\text{unrestricted}}}{\sigma^2_{\text{restricted}}} \qquad [11]$$

where the expression in the numerator represents the estimated variance for the interval regression model when all relevant variables are included and the denominator represents the estimated variance for the model containing just a constant term. In contrast to the McFadden R^2, this goodness-of-fit measure has a direct interpretational equivalence to the conventional adjusted-R^2 from the OLS regression model and thus provides a convenient benchmark for comparing earnings equation fits reported in the empirical literature.

Selectivity Issues

As the sample comprises those who are employed, there is a potential employment selection problem that needs to be addressed. There are a number of ways this could be undertaken but the approach adopted here is to construct a selection correction term from the probit estimates for a participation equation (see Heckman 1979).[5] If the propensity to participate in the labour market is defined in terms of an unobservable latent dependent variable (p_i^*) such that:

$$p_i^* = \mathbf{w}_i'\boldsymbol{\mu} + \omega_i \qquad [12]$$

where $\omega_i \sim N(0,1)$. The probability of participation (i.e., whether the observable dichotomous realization $p_i = 1$ or not) can be linked to the latent variable as follows:

$$\text{Prob}[p_i^* > 0] = \text{Prob}[pi = 1] = \Phi(\mathbf{w}_i'\boldsymbol{\mu})$$

where $\Phi(\cdot)$ is defined as the cumulative distribution function operator for the standard normal. This is the standard probit model and its coefficients are then used to construct the inverse of the Mill's ratio term as $\frac{\phi(\mathbf{w}'\boldsymbol{\mu})}{\Phi(\mathbf{w}'\boldsymbol{\mu})}$ where $\phi(\cdot)$ is defined as the probability density function operator for the standard normal. The selection term (or inverse Mill's ratio) is then inserted into the interval regression model to control for potential selection bias. The selection term is also interpretable as the probit model's pseudo-residual for the case where the event of participation actually occurs. The procedure requires obtaining variables that shift the probability of participation but not the level of earnings; and this is done in order to identify the parameters of the earnings equation. This is not an easy task and the only available instrument that proved feasible was the head of household status and some gender interacted variables. Variables in other household demographics, generally used for this purpose, are just not available in the LFS data sets used here. The lack of household and person identifiers in the dataset prevented the reconstruction of additional instruments for use in the selection equation.

Utilizing the assigned earnings thresholds, two versions of the interval regression model are estimated from the Mincerian form of the earnings equation. In the first version, the basic Mincerian earnings equation is estimated and includes a short list of variables affecting earnings, namely age, education, hours of work, job tenure and the selection correction term. It is intentionally austere, to enable comparison with the existing literature (see chapter 2). In the second configuration the dichotomous variables for industry groups, districts (parishes or strata), and employment status is included. This forms the preferred model for the analysis of the inter-industry wage structure, gender pay gap and the public-private sector pay gap.

The above results for the interval regression model are estimated and analysed for the selected countries in the respective country chapters, and this is followed by a comparative chapter which brings everything together. Once this is done, two alternative models are estimated to check the robustness of the original model. The results of this work are discussed in chapter 9. In the first alternative specification, the interval regression model is re-specified. In the first case the probit is constructed without the age dummies as in the original case, rather the continuous age variable is utilized. In the case of the earnings equation the age variable is left out so as to isolate any effects of age on tenure. In the second case, the original components of the interval regression model are estimated using Ordinary Least Squares (OLS). The OLS model utilises the logarithmic midpoint of the wage as the dependent variable and retains the full complement of independent variables as in the original estimation using the interval regression model.

ENDNOTES

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[1] The dollar is the Eastern Caribbean dollar (EC$) and is used by eight countries, including Dominica and St. Lucia, within the Eastern Caribbean Currency Union. The EC dollar has been pegged to the United States dollar from 1976 at an exchange rate of US$ 1 = EC$ 2.70.

[2] The dollar is the Barbados dollar (BD$) and it has been pegged to the United States dollar from 05 July, 1975 at an exchange rate of US$1 =BD$2.

[3] In the current application the interval widths are all considerably larger than the standard error of the regression model regardless of the specification used. This provides support for the use of the interval regression model in this application.

[4] LIMDEP econometric software and STATA are both used to estimate the interval regression models.

[5] An alternative procedure involves the joint estimation of the selection equation and the interval regression model using FIML. The relevant log-likelihood function is complicated and convergence to the maximum likelihood estimates in our application was not achieved.

CHAPTER 5: THE DETERMINANTS OF LABOUR MARKET EARNINGS: THE CASE OF DOMINICA

Introduction

Dominica is a small mountainous island in the Eastern Caribbean with a population of about 72,000 (IMF 2009). The island is the largest of the four Windward Islands with a total land mass of 750 square kilometres (289.5 square miles). It is located between the French islands of Guadeloupe and Martinique, with which it shares an ethno-linguistic French Creole particularly useful for purposes of communication. Dominica gained full independence from Britain in 1978 but remains a member of the British Commonwealth. The island's British colonial past contributes to the maintenance of a Westminster type government, a British style education system, and on-going trading relations with the United Kingdom.

Dominica is exposed to many challenges, including a small population, exposure to natural disasters particularly hurricanes and storms; small underdeveloped and localized private sector with limited access to financial resources; an undiversified and open economy with reliance on two sectors (bananas and offshore financial services); and high unemployment, particularly among youths and females. The diverse challenges leaves the island exposed to external vulnerabilities in the international markets of trading partners.

In the late 1990s and the early part of the new century, imprudent and unproductive public investments led to a sharp deterioration in the government's fiscal position and an increase in the island's public debt. Further, the erosion of trade preferences with respect to regional banana exports to the European Union (EU) and the subsequent contraction of the agricultural sector, led to greater outward migration and higher levels of both unemployment and under-employment with the former estimated in the late 1990s to be around 20 percent (see CDB 2003).

Partly in response to the events in the agricultural sector, the island's economy has undergone a re-structuring process incorporating important roles for tourism and, more transiently, the infant 'offshore' financial sector (see table A.5.1). The development of the offshore sector slowed in the late 1990s following greater international scrutiny of financial institutions and the requirement for transparency in the delivery of services.

In 2000, the Financial Action Task Force (FATF), an inter-governmental agency comprised of all OECD countries evaluated 26 countries using 25 criteria and placed 15 of these countries, including Dominica, on a list of non-cooperative countries and territories (NCCTs). The Government of Dominica was strongly advised to implement legislation and reform measures to correct deficiencies in the anti-money laundering system. The FATF removed Dominica from the list of NCCTs in October 2002, following improvements in anti-money laundering systems.[1] In addition to blacklisting by the FATF, the infant offshore industry in Dominica is faced with competition from mature and well-developed jurisdictions (Cayman Islands, the Bahamas, and the British Virgin Islands) in the Caribbean with existing organised legal and administrative frameworks in place to manage the emerging sector (see table A.5.2).

In response to the economic challenges, the Government of Dominica committed to a program designed to stimulate economic growth by introducing policies to strengthen external competitiveness, and reform both the public sector and the island's financial system. The program's implementation is likely to strongly impact the island's labour market, the performance of which will ultimately determine the success or failure of the reform program. It has long been acknowledged that the labour market can provide an effective mechanism to either enhance (or hinder) economic growth, and is regarded as the primary conduit through which the pecuniary benefits or penalties of a reform program are conveyed to individuals and hence households. Thus, knowledge of the labour market earnings determination process is invaluable for the formulation, design and interpretation of public policy.

In spite of the adverse economic developments, the island's social indicators (e.g., infant mortality, primary school enrolments, adult literacy and life expectancy) remain higher than the average for upper middle-income countries (see table 5.1). However, the island is characterized by a high poverty incidence with headcount rates at the end

of the twentieth century amongst the highest in the Caribbean, an outcome viewed as primarily linked to the decline of agricultural production (see CDB 2003). In particular, poverty among Dominica's indigenous peoples, the Carib Indians, is high, with about two-thirds categorized as poor and almost one-half classed as indigent (see CDB 2003). Dominica remains the only Eastern Caribbean Island to have an indigenous population. The Carib Indians account for about five percent of the population and reside on a communal reserve on the north-eastern side of the island (see Government of Dominica 2001).

Another serious challenge confronting the economy is chronic unemployment. This is particularly severe among the youth, for example in 1999, an estimated two-fifths of youths aged 15 – 24 are reported as unemployed. The prevalence of unemployment within this age group is particularly pronounced among males with about one-half of male youths within this age group reported as unemployed (see table 1.1 in chapter 1).

The structure of the current chapter is as follows. The next section gives further background information on economic and social sector indicators. Section three presents the empirical results and section four concludes.

Background

The economic difficulties experienced in Dominica in the 1990s were the effects of global factors, including the slowdown in world economies, trade liberalization and the concomitant impact on the banana industry, which in turn affected export revenues, agricultural output and employment.

In terms of economic activity, agriculture accounts for slightly less than one-fifth of GDP, with bananas forming the main agricultural commodity. The industrial sector accounts for slightly more than one-fifth of GDP and mainly comprises light manufacturing. Industrial output plays a varying but lately declining role in the island's economy. Recently, Dominica's most significant regional manufacturing export market, the western Caribbean island of Jamaica, has also proved increasingly competitive, given that country's reduction in its external tariffs as required by

commitments to regional trading agreements. The services sector account for slightly less than three-fifths of value-added in the Dominican economy. In general, tourism is gaining an expanding role as the economy evolves. However, tourism's contribution to GDP continues to be small as the island lacks international air access, white sand beaches and the international chain hotel brands. The real GDP per capita in 2004 is US$3,821, thus situating Dominica in the category of middle-income economies. Inflation is relatively stable, although as a net importer, price rises such as the case in the 2008 food and energy crisis are rapidly transmitted to the domestic economy. Public debt is high, in 1999 public sector debt stood at about 129 percent of GDP, growing to nearly 170 percent of GDP in 2002. However by 2004, the ratio was on a downward trajectory due to engagement with the IMF first on a Stand By-Arrangement (SBA) in 2002 and subsequently on a Poverty Reduction and Growth Facility (PRGF) from 2003 – 2006. Table 5.1 provides an overview of selected macroeconomic and social indicators for Dominica.

Table 5.1. Selected Macroeconomic and Social Indicators for Dominica

	1999	2004
Population and Demography		
Population (total)	72	72
Life expectancy at birth (years)	76	†
Male	74	†
Female	78	†
Emigration rate of tertiary educated (in percent of total tertiary educated) 1/	63.9	†
Unemployment	15.7	†
Economic Indicators		
GDP per capita (current US$)	3,743	3,821
Inflation Rate	1.2	2.0
Public sector debt (percent of GDP)	129.6	116.0
National Accounts		
GDP by Economic Activity (share of total in percent)		
Agriculture	18.7	19.8
Manufacturing	8.1	8.8
Services	58.9	55.0

Source: Eastern Caribbean Central Bank and World Bank World Development Indicators
Notes:
(a) 1/ Data for 2000
(b) † denotes data is not available

The Education System

Following the 'Education for all – Dakar Framework for Action' in 2000, the Government of Dominica committed to attaining the goal of '*free and compulsory*

primary education for all'.[2] In 1997, the Government formalized the objective, by setting compulsory education at 5-16 years, by ratification of the Education Act (1997). In 2001, Dominica reached the goal of universal primary education, in satisfaction of the Millennium Development Goals. In September 2005, Dominica attained universal secondary education in satisfaction of a national goal.

The education system is pivotal in transforming the labour market and in equipping workers with the requisite skills to move from the unskilled agricultural sector into services based sectors requiring skilled human capital. The Government of Dominica is aware of the low quality of education provision; the need to expand tertiary education access and increase job training programmes (see Government of Dominica 2006; Government of Dominica 2003). The Government is slowly implementing measures to improve the human capital capacity of segments of the labour force through an expansion in skills training programmes. The analysis utilises data for 1999, but since then the Government has revamped the tertiary education system by expanding the tertiary institution into a full-fledged state college with different faculties granting associate degrees. This has resulted in an increase not only in course offerings but also in places. The increase in post-secondary educational training is an important initiative on the part of the government, as evidence in the empirical literature has identified an endemic problem of skills mismatch, which in part works to keep the unemployment levels in the Caribbean region high (see World Bank 2005a, 2005b; Downes 2004).

The review of the education system in Dominica is important to an understanding of the empirical analysis on the rates of return calculations undertaken in this chapter. The empirical results will shed light, *inter alia*, on the findings for the rates of return to education, the inter-industry wage gap, the public sector pay premium and the gender pay gap for Dominica.

Empirical Results

We initially estimate expression [1] where X contains variables capturing age, its quadratic, a set of tenure dummies, gender, an ethnicity control, and the log of hours

worked. This forms the basis for computing the rates of return to educational qualification based on expression [5] and its variants (see chapter 4).

The regression equation estimates for the basic Mincerian equation are reported in column one of table 5.2. The goodness-of-fit measure is more than adequate by the standards of such cross-sectional models suggesting that well over one-third of the variation in log earnings is explained by age, gender, ethnicity and the human capital measures. The selection effect is found to be imprecisely estimated suggesting no evidence of selectivity bias in this particular specification.[3] The estimates for the linear and quadratic terms in age are both well determined implying a concave age-earnings profile consistent with human capital theory. The point estimates indicate that monthly earnings are maximized at an average of about 44 years for this sample.

The estimated tenure effects are only statistically relevant for those with five or more years of job tenure. In particular, individuals with ten or more years on the job enjoy a monthly earnings premium of 22.5 percent compared to someone with just six or less months, on average and *ceteris paribus*.[4] The estimates also reveal strong evidence of labour market disadvantage for those belonging to the ethnic minority Carib who earn, on average and *ceteris paribus*, 37.5 percent less in monthly earnings than the black and mixed race base group. The separation of mixed race from the Black base group was not supported by the data given an absolute t-ratio of 1.086, hence the conflation of these two ethnic groups. In addition, the base also includes a very small number of whites representing about 0.4 percent of the total sample. Though the proportion of the Carib group within the sample is relatively small, this nevertheless represents a sizeable labour market pay disadvantage.

Table 5.2. Interval Regression Model Estimates for Log Monthly Earnings

Variables	Basic Mincerian	Augmented (1)	Augmented (2)
Constant	2.8489***	3.8037***	3.5546***
	(0.3447)	(0.3673)	(0.3619)
Age	0.0702***	0.0527***	0.0431***
	(0.0131)	(0.0138)	(0.0137)
Age^2	-0.0008***	-0.0006***	-0.0005***
	(0.0002)	(0.0002)	(0.0002)
Male	0.2376***	0.2430***	0.1840***
	(0.0519)	(0.0514)	(0.0545)
Carib	-0.4700***	-0.3401***	-0.2552**
	(0.1238)	(0.1223)	(0.1175)
Primary	0.1055	0.0797	0.0298
	(0.1001)	(0.969)	(0.0916)
Secondary Incomplete	0.4778***	0.3992***	0.2804*
	(0.1464)	(0.1503)	(0.1458)
Secondary	0.6547***	0.5187***	0.3728***
	(0.1087)	(0.1081)	(0.1047)
Tertiary	0.9570***	0.7398***	0.6131***
	(0.1131)	(0.1176)	(0.1141)
Other Education	0.8408*	0.6489	0.4372
	(0.5129)	(0.5299)	(0.4883)
University	1.1664***	0.9215***	0.8127***
	(0.1446)	(0.1395)	(0.1361)
Tenure_2	-0.0462	-0.0276	-0.0311
	(0.0960)	(0.0965)	(0.0912)
Tenure_3	0.0468	0.0523	0.1250*
	(0.0695)	(0.0682)	(0.0664)
Tenure_4	0.2367***	0.2363***	0.2994***
	(0.0732)	(0.0722)	(0.0690)
Tenure_5	0.2029***	0.2525***	0.3637***
	(0.0740)	(0.0747)	(0.0721)
Log(Hours)	0.5393***	0.4626***	0.4551***
	(0.0589)	(0.0572)	(0.0541)
Government	†	0.2171***	0.1322**
		(0.0507)	(0.0663)
Self-employed	†	-0.1190**	0.0010
		(0.0526)	(0.0509)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.0726	-0.1500*	-0.1810**
	(0.0826)	(0.0883)	(0.0879)
Industry Controls	No	No	Yes
District Controls	No	Yes	Yes
Adjusted-R^2	0.4011	0.4486	0.5122
McFadden R^2	0.1052	0.1219	0.1463
Pseudo Log-Likelihood	-2359.9	-2315.8	-2251.4
σ	0.6362	0.6104	0.5741
Sample Size	1138	1138	1138

Notes:
(a) The estimated standard errors reported in parentheses are based on Huber (1967).
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) † denotes not applicable in estimation.

Rates of Return to Educational Qualifications

There is no evidence of a gender differential in the estimated education level coefficients using the basic Mincerian equation. A set of six gender-education interaction terms, when included in this austere specification, is found to be jointly

statistically insignificant using a Wald test (χ^2_6 = 9.54, prob-value= 0.145).[5] Table 5.3 exploits the relevant estimates from the basic Mincerian model in table 5.2 to compute using expression [5] private rates of return to educational qualifications. Given the findings in regard to gender, these estimates are interpretable as common across both gender groups.

The average estimated return to a primary education in Dominica, the highest level attained by almost two-thirds of the sample, is found to be statistically indistinguishable from zero. In contrast, the annualized return to a secondary education is about 11 percent, while those with completed tertiary education and university degree holders secure average (marginal) returns of about 15 and 17 percent respectively. Thus, the labour market in Dominica only values formal human capital assets acquired at post-primary level. The rewards for possessing such assets are large and broadly compatible with the empirical findings reported in the literature from other developing and developed countries. The returns to tertiary and university education are close to those for the United States and the United Kingdom (see Machin and Stevens 2004). Psacharopoulos and Patrinos (2004) report average private rates of return to education for Latin America and the Caribbean of 17 percent and 19.5 percent for secondary and higher education, respectively. Using all appropriate variance and covariance terms to construct a t-ratio, no statistical difference in point estimates was detected between the secondary and the university annualized rate of return (|t| = 0.80). The lack of statistical significance between secondary and university rates of returns points to the existence of inadequate incentives for the accumulation of post-secondary qualifications in Dominica.

It is worth noting that the pattern of returns to the array of educational qualifications for Dominica differs from that obtained in the literature for developing countries where the labour market returns to primary education tend, on average, to be higher than those for secondary and tertiary qualifications (see Psacharopoulos et al. 2004). However, the result obtained is not entirely surprising for Dominica given the small number of employees with no education (about four percent) and the very large number with primary education (almost 60 percent). The island's educational attainment profile is thus superior to that prevailing in many developing countries.

Table 5.3. Annualized Rates of Return to Educational Qualifications

Qualifications	Rates
Primary	0.0151
	(0.0143)
Secondary	0.1098***
	(0.0111)
Tertiary	0.1512***
	(0.0340)
University	0.1706***
	(0.0376)

Notes:
(a) The calculations are based on the basic Mincerian log earnings equation from table 5.2.
(b) See expression [5] in chapter 4 for the relevant formula.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) The duration of primary schooling is assumed seven years; secondary schooling is assumed five years; a tertiary course is assumed two years; a university degree is assumed three years.

Inter-industry Wage Structure

The final column of table 5.2 (Augmented (2)) contains estimates for the earnings equation that includes controls for one-digit industries. The estimated selection effect is now found to be very well determined. However, its negative sign is counter-intuitive and provides an interpretational challenge since it suggests the unobservables influencing the employment decision (e.g., motivation, ability etc.) are inversely related to those determining earnings. Given the sample average estimate reported for the selection variable in table A.3.1 (0.4973) and the estimated selection coefficient (–0.181), the result suggests that an individual with sample average characteristics that selects (or is selected) into employment earns nine percent less (i.e., $-0.181 \times 0.4973 = -0.090$) in monthly earnings than someone with the same observable characteristics drawn at random from the island's population. It seems implausible that negative selection effects in terms of unobservables are found to dominate. The result may be attributable to the poor quality of instruments available in the Dominica LFS, though the instruments used for this application appear to be empirically satisfactory for the task.

A set of gender interaction terms with five educational variables (the interaction with 'Other Education' was excluded given an extremely small cell size) and eight district variables were found to jointly influence the probability of employment (registering a chi-squared value of 43.6 (prob-value=0.0004) but not log earnings (registering a chi-squared value of 15.7 (prob-value=0.170)). These two sets of gender interactions could

thus tentatively be construed as providing reasonably adequate identifying instruments for the selection effects of interest in this paper. It should be stressed, however, that the substantive findings of this paper remain invariant to the exclusion of the selection correction term from either the final or any of the other specifications reported in table 5.2.

The inclusion of industry controls in table 5.2 slightly magnifies the job tenure effects for five or more years and marginally reduces the turning point at which earnings are maximized to 43 years. In addition, the estimate corresponding to the self-employed is rendered statistically insignificant given its effect is now presumably absorbed within the industry controls (e.g., agriculture and retail). The government sector premium, however, retains its statistical significance and the Carib disadvantage, though also remaining significant, is narrowed. The attenuation in the latter effect with the introduction of additional controls is not surprising given the Carib group's concentration in particular districts and employment activities (e.g., agriculture) within Dominica. [6]

The interval regression model specification defined as augmented (2) in table 5.2 is broken down by gender and the results are presented in table 5.4. The delineation by gender highlights a wide margin in the turning points for the different gender groups. The male group now maximizes earnings at the age of 47 years, while females attain their maximum earnings at the age of 41 years. The evidence suggests levelling-off in the earnings of women earlier in the employment cycle than males, again pointing to the industries in which females concentrate, with many of these sectors lacking trade unions or opportunities for upward mobility.

The age turning point for males is interesting, but not peculiar and this occurrence is again attributed to industry affiliation. About one-third of males are employed in the agricultural sector and the nature of the Dominican agricultural sector is characterized by an elderly work force. It is for this reason that the current diversification thrust by the government seeks to attract the large number of unemployed youth into the agricultural sector for continuity of the sector for reasons of food security and to promote entrepreneurship. The advanced age of the displaced and unskilled banana farmers is creating problems in re-training the elderly farmers to secure jobs in other

productive sectors. In 1998, the government introduced the Banana Production Recovery Plan to target among other goals a core group of serious minded farmers willing to take on farming as a full-time commercial venture and commit to increase product quality and yield per acre. The agricultural sector in Dominica operates in the absence of minimum wages and so remuneration to agricultural workers is low, but includes a host of perquisites to compensate for low wages (for example, meals, free housing and transportation, and free agricultural produce).

Table 5.4. Interval Regression Model Estimates for Log Monthly Earnings by Gender for Augmented (2)

Variables	Males	Females
Constant	4.1581***	2.0967***
	(0.5054)	(0.6140)
Age	0.0315*	0.1029***
	(0.0185)	(0.0249)
Age^2	-0.0003	-0.0013***
	(0.0002)	(0.0003)
Carib	-0.4431***	0.1316
	(0.1492)	(0.1849)
Primary	0.0175	0.0504
	(0.1041)	(0.1698)
Secondary Incomplete	0.2262	0.4187*
	(0.1670)	(0.2558)
Secondary	0.3546***	0.5514***
	(0.1212)	(0.1943)
Tertiary	0.5533***	0.9066***
	(0.1304)	(0.2283)
Other Education	0.5927	-0.2271
	(0.5693)	(0.2566)
University	0.8657***	1.1207***
	(0.1728)	(0.2382)
Tenure_2	-0.0009	-0.0710
	(0.1046)	(0.1809)
Tenure_3	0.1069	0.1236
	(0.0869)	(0.1015)
Tenure_4	0.2376***	0.3379***
	(0.0896)	(0.1071)
Tenure_5	0.3511***	0.2790**
	(0.0924)	(0.1140)
Log(Hours)	0.3854***	0.4952***
	(0.0722)	(0.0773)
Government	0.1629**	0.1509
	(0.0801)	(0.1126)
Self-employed	0.0213	-0.0074
	(0.0583)	(0.0907)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ Selection Correction Term	-0.3174**	0.2646*
	(0.1468)	(0.1565)
Industry Controls	Yes	Yes
District Controls	Yes	Yes
Adjusted-R^2	0.4963	0.5684
McFadden R^2	0.4773	0.6792
Pseudo Log-Likelihood	-1378.6	-845.9
σ	0.5471	0.5821
Sample Size	698	440

Notes:
(a) The standard errors in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) The mean of the selection correction term for males is 0.3660 (0.2786) and for females 0.7056 (0.3556)

Minimum wage legislation exists on the Statute Books for Dominica (Labour Standards Act, Chapter 89:05, Act 2 of 1977; amended by Act No. 36 of 1983, Act No. 12 of 1990, and Act No. 16 of 1991). Functional minimum wages have not really been implemented until as recently as June 2008; this implementation is dependent on the goodwill of employers, and so is irrelevant to the analysis reported here.[7] In November

1989, the Government instituted minimum wage rates in keeping with the Act but the rates were never properly implemented. Again, in 2008, the Government announced an increase in minimum wage rates, the enforcement of which remains dependent on the goodwill of employers. In the first quarter of 2010, the government as part of a pledge to the electorate in advance of the December 2009 general elections implemented a monthly minimum wage of EC$1,000 for full-time established workers in the public sector.

The industry effects themselves can be interrogated more thoroughly using expression [8] outlined in chapter 4 and the results of this exercise are reported in table 5.5. This reveals that the 'construction', 'finance, 'transport', and 'utility' industries are characterized by sizeable premia relative to the employment weighted average. The 'finance' premium likely reflects the island's transient relationship with 'off-shore' banking activities, which was curtailed in the early part of the current century. Meanwhile, the 'public administration' sector enjoys a more modest differential of 17.5 percent relative to the average. In contrast, the 'agricultural' and the 'domestic services' sectors are found to be considerably below the average with earnings in these two sectors 31 and 32 percent below the employment weighted average respectively. The result for the former may reflect the effect of changing EU trade preferences. The remaining industries are found to be statistically indistinguishable from the average.

The estimate for the overall variability in inter-industry wage dispersion is high at about 0.25 regardless of the measure used and thus situates the dispersion in the industrial wage structure for the Dominica labour market closer to the United States (see Krueger and Summers 1988; Haisken-DeNew and Schmidt 1997; Zanchi 1995) than Europe (for example, see Edin and Zetterberg 1992 for Sweden; Vainiomäki and Laaksonen 1995 for Finland; Haisken-DeNew and Schmidt 1997 for Germany; Zweimüller and Barth 1994 for Austria and Norway). The explanations provided for the dispersion in quality-adjusted industry wages are many and varied (see Thaler 1989). The existence of such a wide dispersion in Dominica may be to some degree attributable to the exercise of monopolistic power in the higher paying industries and the absence of strong labour market institutions (e.g., trade unions and a minimum wage) in other industries (e.g., 'agriculture', 'retail' and 'hotels').

Table 5.5. Inter-industry Deviations

One-Digit Industry Sector	Deviation from Average
Agriculture	-0.3683***
	(0.0471)
Manufacturing	0.0176
	(0.0573)
Utility	0.4497***
	(0.0968)
Construction	0.3163***
	(0.0656)
Retail	0.0551
	(0.0433)
Hotels	0.0478
	(0.1044)
Transport	0.2933***
	(0.0639)
Finance	0.2349***
	(0.0546)
Public Administration	0.1614**
	(0.0823)
Social Services	0.0934
	(0.0655)
Domestic Services	-0.3812***
	(0.1089)
Overall Variability (Krueger & Summers)	0.2549
Overall Variability (Haisken-DeNew & Schmidt)	0.2471

Notes:
(a) The calculations are based on the augmented (2) equation from table 5.2.
(b) See expression [8] in chapter 4 for the relevant formula.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) See text in chapter 4 for the computation of the overall variability measures.

The bargaining powers of the trade unions have waned since the formation of the union movement in the 1960s. About three unions remain sufficiently vibrant and continue to negotiate small wage increases or demand and receive additional benefits for their members. These are the unions representing public sector employees (public servants union and the police welfare association) and the union for waterfront workers. About one-half of females congregate in the private sector and this sector historically lacks trade union representation and so growth in the earnings of employees in this sector is sporadic and at the discretion of the private sector employer.

The strongest gender differences in pay determination reported in table A.5.3 relate to the role of industry. The gender differences in the island's inter-industry wage structure are now investigated. The estimated gender-specific industry effects can be interrogated by normalizing their effects as a deviation from an overall industry weighted average. The estimated earnings differences are thus expressed relative to an overall average rather than the arbitrary base group used in estimation, and are thus more easily

interpretable (see Krueger and Summers 1988; Haisken-DeNew and Schmidt 1997; Zanchi 1998).

Table 5.6. Inter-industry Deviations by Gender

One-Digit Industry Sector	Male Deviations from Average	Male Sample Proportions	Female Deviations from Average	Female Sample Proportions
Agriculture	-0.3898***	0.328	-0.2632**	0.136
	(0.0467)		(0.1121)	
Manufacturing	0.0944	0.085	-0.0497	0.098
	(0.0728)		(0.0913)	
Utility	0.5480***	0.020	0.2159	0.011
	(0.1085)		(0.1752)	
Construction	0.3180***	0.120	0.5753***	0.002
	(0.0647)		(0.1595)	
Retail	0.1627***	0.116	-0.0065	0.195
	(0.0581)		(0.0640)	
Hotels	0.0840	0.011	-0.0041	0.066
	(0.2524)		(0.1107)	
Transport	0.3535***	0.082	0.1333	0.043
	(0.0714)		(0.1235)	
Finance	0.1276*	0.103	0.3416***	0.100
	(0.0720)		(0.0871)	
Public Administration	0.1947*	0.062	0.0815	0.057
	(0.1031)		(0.1380)	
Social Services	-0.0632	0.069	0.1724**	0.207
	(0.1022)		(0.0783)	
Domestic Services	0.2640	0.004	-0.4953***	0.084
	(0.1991)		(0.1137)	
Overall Variability (Haisken-DeNew & Schmidt)	0.2850	†	0.2029	†

Notes:

(a) Inter-industry wage effects are computed using estimates from the gender-specific log earnings equations reported in table 5.4.

(b) Wald test for gender differences in industry deviations, $\chi^2_{11} = 30.02$*** (prob-value=0.001).

(c) The Duncan & Duncan index of industrial dissimilarity = 0.37. This is computed as half the sum of the absolute gender differences in the one-digit industry proportions.

(d) The overall variability measure summarizes the variability in the deviations around the mean. See Haisken-DeNew and Schmidt (1997) for the computational details.

(e) † denotes not applicable in estimation.

Some caution must again be exercised here since gender representation is small in certain industries (e.g., women in 'construction' and men in 'domestic services'). Table 5.6 reports the inter-industry wage differentials for each gender group. On the basis of the Duncan and Duncan (1955) dissimilarity index (see notes to table 5.6), there is evidence of gender segregation at the one-digit level with the extent resonant of the findings reported by Olsen and Coppin (2001) for Trinidad and Tobago. There is substantially greater overall variability in the industry wage structure among men than women and an overall statistically significant gender differential in the industry structure was detected (see notes to table 5.6). The highest paying industries for men,

ceteris paribus, are 'utility', 'construction', 'transport' and the 'retail' sector. In contrast, for women 'finance' and 'social services' represent the industries with the greatest pecuniary rewards. The disappearance of the island's financial 'offshore' sector may act to reduce the wage advantage enjoyed by women in the former of these two sectors. For both gender groups, 'agriculture' is poorly paid relative to the gender-specific average but even this sector is trumped by those women employed in 'domestic services' who earn about 40 percent less than the female average.

Public Sector Wage Premium and Gender Pay Gap

The second column of estimates reported in table 5.2 is based on augmenting the basic Mincerian equation through the inclusion of controls for district and employment type. The augmentation yields a reasonable enhancement to the goodness-of-fit measure and the resultant regression model provides a framework for determining the size of the public sector pay premium in Dominica. The raw public sector pay gap, found by estimating a model containing a constant and dummy variable for public sector and self-employment finds a raw (or unadjusted) public sector premium of 62.9 percent. The inclusion of additional controls as reported in the second column of table 5.2 reduces the premium, but nevertheless government employees earn, on average and *ceteris paribus*, 24.2 percent more than those in private sector employment. This represents a sizeable 'mark-up' and one that cannot be explained by the superior human capital and other endowments possessed by public sector employees given human capital and other controls are present in this regression equation. In addition, this premium, given it is based exclusively on earnings, is likely to under-state the wider range of benefits associated with public sector employment on the island (e.g., holiday, training, sickness and pension entitlements). The existence of large wage premium for public sector employees mirrors the existing literature for other developing countries (See Anós Casero and Seshan 2006; Terrell 1992).

The raw (or unadjusted) public sector premium for women is 79.2 percent above the base pay for women in the private sector, the reference group. Once additional controls for human capital characteristics, location and industry affiliation are included, the premium for women dissipates with earnings for women not being statistically different

from zero. The raw public sector premium for males is lower at 50.6 percent above that of an individual in the private sector base group. The average *ceteris paribus* pay premium for males is 17.7 percent above the earnings in the reference group (see table 5.7). The inclusion of additional controls (see column 2 in table 5.2) results in reduced public sector premiums for both gender groups as reported by the adjusted public sector pay gap. The findings suggest that the public sector in Dominica rewards males better than women.

The Government of Dominica has recently pursued an array of public sector reform policies that have entailed enforced wage reductions for public sector workers, so it could be conjectured that the pecuniary advantage reported here using the 1999 data may have diminished to some degree in the wake of this policy's introduction. Wages and salaries account for an estimated one-half of government expenditure and is the largest expenditure category and hence a targeted area for the proposed streamlining in public expenditure. The public sector attracts the more educated and in general, about one-half of public sector employees are in possession of post-primary educational qualifications, compared to one-third of private sector employees.

In contrast to the more favoured labour market position enjoyed by public sector workers, the self-employed in Dominica earn about 11.2 percent less than those in private sector wage employment, on average and *ceteris paribus*. This is largely attributable to the industries within which they mainly concentrate (e.g., agriculture and retail). However, some caution is perhaps required here given the heterogeneous nature of this group as its membership potentially spans a range of activities from elementary unskilled occupations to the higher level professional categories. In addition, the measure for self-employed income may also include returns to physical capital given the nature of such employment. This suggests some further caution in interpretation.

The estimate for the raw (or unadjusted) gender pay gap suggests that men earn on average 22.3 percent more than women in the Dominica labour market without controlling for any productivity or other characteristics. The raw (or unadjusted) gender pay gap is computed using the interval regression model containing only a constant and the male dummy variable. The estimated coefficient for the male dummy suitably transformed provides the basis for the computation of the relevant raw gender pay gap

estimate cited above. The average *ceteris paribus* male advantage was computed at 26.8 percent using the basic Mincerian equation. The inclusion of additional controls diminished this effect with the final earnings equation augmented by districts and one-digit industries yielding a male advantage of the order of 20.2 percent. These findings could be taken to suggest that treatment differentials are more important than endowment differentials in explaining the gender pay gap for Dominica. Table 5.7 provides a summary of the public sector pay premium and the gender pay gap.

Table 5.7. Dominica Public Sector Pay Premium and Gender Pay Gap

	1999		
	All	**Males**	**Females**
Public Sector Pay Premium			
Raw (or unadjusted) Public sector pay premium	0.4878***	0.4095***	0.5834***
	(0.0625)	(0.0781)	(0.1005)
Ceteris paribus (or adjusted) public sector pay premium 1/	0.1322**	0.1629**	0.1509
	(0.0663)	(0.0801)	(0.1126)
Gender Pay Gap			
Raw (or unadjusted) gender pay gap	0.2015***	†	†
	(0.0504)		
Ceteris Paribus (or adjusted) gender pay gap 2/	0.2376***	†	†
	(0.0519)		
Ceteris Paribus (or adjusted) gender pay gap 3/	0.1840***	†	†
	(0.0545)		

Notes:
a) 1/ reports the *ceteris paribus* public sector pay premium from the augmented (2) specification.
b) 2/ reports the *ceteris paribus* gender pay gap from the basic Mincerian specification.
c) 3/ reports the *ceteris paribus* gender pay gap from the augmented (2) specification.
d) The public sector pay premium and the gender pay gap in the table are the coefficients reported in log-points.
e) † Implies not applicable to current specification.

The gender dimension to pay is now further investigated using Wald tests to determine the statistical significance of gender interactive variables using the broadest specification reported in table 5.2 (Augmented (2)). Table A.5.3 in the appendix reports the results of this exercise and reveals statistically significant gender differences in the estimated effects for age, industry, ethnicity and the selection variable. Thus, in order to provide a more complete portrait of gender and labour market pay for Dominica, separate earnings equations by gender group are estimated and reported in table 5.4. This exercise reveals that the estimated selection effects are opposite in sign for the two gender groups. There is negative selection for the male sub-sample and a positive effect for females, though the latter lies on the cusp of conventional statistical significance. The quality of instruments again remains a potential issue here and the small sample sizes for each gender group warrant some interpretational caution. The gender

differences in age effects reflect both the quadratic estimate in age for men being poorly determined and the existence of a much steeper linear age effect for women.

A key finding of table 5.4, however, relates to the estimated effects for the Carib. The strong negative effect is confined to the male group with Carib men, on average and *ceteris paribus*, earning 36 percent less than the corresponding base group comprising all other men. In contrast, Carib women experience no unequal treatment relative to other women in the Dominica labour market.

Conclusions and Summary of Findings

The island's labour market system places a significant valuation on post-primary education with the annualized rates of return for tertiary and university qualifications comparable to those prevailing in more developed economies. The study found no evidence of gender differences in how the labour market valued such human capital assets. However, the differential in the average (marginal) estimated returns between secondary schooling and university level is not statistically significant and thus potentially provides inadequate incentives for the accumulation of post-secondary qualifications in Dominica.

The analysis also provided the basis for an inspection of the gender pay gap in Dominica. The empirical evidence confirmed the existence of an unequal treatment of women in terms of labour market earnings with the magnitude of the male pay advantage around 20 percent compared to a raw (or unadjusted) gender pay gap of about 22 percent. Thus, the study finds little evidence that gender differentials in endowments provide an important part of the narrative in regard to female wage disadvantage. The gender pay gap estimates for Dominica are in broad agreement with those found for Trinidad and Tobago by Olsen et al. (2001) and for Jamaica by Hotchkiss and Moore (1996).

There was also a strong gender dimension to the inter-industry wage structure in Dominica and though the agricultural sector was found to be poorly paid for both gender groups, women in 'domestic services', on average and *ceteris paribus*, were paid

about 40 percent less than the female average. This sector represents about 8.5 percent of total female employment on the island and though there may be some non-pecuniary benefits associated with engagement in this activity to off-set the low earnings, the poor nature of female pay in this sector is a potential source of concern. In addition, women in the 'finance' sector were found to fare well above the female average using the LFS data for 1999. Only more recent data will allow a detailed investigation of whether the recent departure of the financial 'offshore' sector from the island has impacted more adversely on women than men in terms of labour market pay rewards.

The public sector wage premium in Dominica has attracted recent attention given government concern over the rise in the country's public sector deficit. The estimates suggest that government employees in 1999 earned, on average and *ceteris paribus*, 24.2 percent more than those in private sector employment. Thus, public sector workers in Dominica appear to extract a sizeable rent which, in all likelihood, is understated given the broader package of non-pecuniary benefits that accrue to workers in this sector. The sizeable rent accruing to government employees over their private sector counterparts are in keeping with the literature for developing countries, (see Anós Casero et al. 2006; and Terrell 1992). The public sector pay setting mechanism, given its inherent insensitivity to market forces, may have adverse 'spill-over' effects on other segments of the Dominica labour market resulting in an inefficient allocation of labour and consequent waste of valuable resources. The government's structural reform program, as introduced in the 2003/4 budget, envisaged a five percent reduction in the nominal wages and allowances of public sector workers, which clearly represents a very modest step in the right direction. Again only time will reveal whether the policy sufficiently erodes the rent extraction that currently characterizes the public sector.

The earnings regression framework is also used to investigate for the presence of ethnic disparities in labour market pay. The Carib (or Amerindian) represent the indigenous people of the island and a modest share (under five percent) of its population. In a direct comparison with the Black and mixed race dominated base group, the estimates suggest evidence of labour market disadvantage for this ethnic minority but one with a strong gender dimension. In controlling for industry and separating by gender, the study finds that the female ethnic disadvantage is negligible but the male disparity is of the order of about 36 percent. This represents a sizeable ethnic-related labour market

disadvantage for Carib men and is considerably larger than the ethnic wage differentials reported for Trinidad and Tobago by Coppin and Olsen (1998).

The *ceteris paribus* industrial wage structure reflected both recent trade policy changes in regard to agriculture and the vestiges of the island's ephemeral embrace of the off-shore sector. The degree of inter-industry wage dispersion was found to be high compared to most industrialized economies but closely mirrored that prevailing in the United States.

The analysis provides seminal benchmark estimates for the small island of Dominica across a range of important labour market themes, notwithstanding that the evidence is based on just one cross-sectional point in time. Given the structural and policy changes that the island's economy is currently undergoing, a useful exercise, and one central to an agenda for future research, would be to re-visit these issues with more recent data to determine how human capital returns, the public sector wage premium, ethnic disadvantage, and the gender-specific inter-industry wage structure have evolved given the process of structural change on which the island's economy has recently embarked.

ENDNOTES

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[1] See FATF excerpts on Money Laundering; Annual Report 1999-2000; and FATF press release dated October 2002.
[2] A list of the age range of compulsory education for 207 countries is available at www.uis.unesco.org.
[3] The probit results are included in Table A.5.4 for information. The poorly determined selection effect may reflect the quality of the instruments used and poor identification. But the absence of instruments curtails an investigation of this.
[4] Given the logarithmic nature of the dependent variable, the k^{th} dummy variable effect is translated into a percentage change using the transformation $\exp[\beta_k - 1]\times 100$ throughout.
[5] The Wald tests are computed using the Huber (1967) robust variance-covariance matrix to test for the statistical significance of the relevant gender interaction terms. Given the use of the robust variance-covariance matrix in estimation, a likelihood ratio test is inappropriate.
[6] The Carib reserve is located on the north east of the island in the parish of St. David.
[7] The Labour Standards Act, Chapter 89:05 of 1977, outlines the setting of wages for employees, hours of work, vacation time and general matters relating to employee welfare.

CHAPTER 6: LABOUR MARKET EARNINGS DETERMINATION PROCESS: EVIDENCE FROM ST. LUCIA

Introduction

St. Lucia, like Dominica, is a small island economy in the Eastern Caribbean with a land area of 238 square miles, an estimated population of 162,311 (in 2004), and is classified as a lower-middle income country (Government of St. Lucia 2006). St. Lucia gained independence from the United Kingdom in 1979, but maintains political, educational and judicial systems that are strongly influenced by its colonial past. The economy of St. Lucia has historically been agrarian based. However, from the 1990s, the steady and phased dismantling of preferential trade access for Eastern Caribbean bananas to European Union (EU) markets, the effects of natural disasters, plant diseases and reductions in global commodity prices led to significant declines in agricultural output and consequently incomes (see IMF 2002). The island's economy has recently made a very gradual re-orientation towards a services-based economy that is largely dominated by tourism and, in recent times, but to a lesser and more transient extent, offshore financial services (see Government of St. Lucia 2004a).

The recent economic and other changes experienced by St.Lucia potentially affect the island's labour market. The labour market acts as a conduit for pursuing economic growth and transferring the resultant benefits or costs of economic restructuring to individuals and households. Knowledge of the labour market earnings determination process for St.Lucia, and its evolution over time, can provide invaluable insights on the labour market effects of the structural changes and other adverse effects highlighted above. The empirical examination of earnings over time can reveal how, among other things, returns to human capital assets and the inter-industry wage structure have been affected by change as the island makes a transition from a traditional agricultural-based economy to a more diversified one.

The rationale for the current chapter is to investigate the determinants of labour market earnings in St. Lucia with a view to informing on four separate labour market themes briefly alluded to in the above sections. The first empirical objective is to provide some insight into how the labour market in St. Lucia values formally acquired human capital assets, and whether the island's economic re-structuring has affected these valuations over roughly a ten-year period straddling the end of the last century and the early part of the current one. The first research question is addressed through the estimation of Mincerian earnings equations for two separate years and the use of the resultant estimates to compute private rates of return for an array of formal human capital measures. The exercise also allows the findings to be situated within both a Caribbean context and more broadly the international literature for developed and developing economies.

The second research question focuses on investigating the nature of the inter-industry wage structure in the St. Lucia labour market given the island has undergone a transformation towards a more service-based economy. The empirical approach will provide the basis for quantifying both the *ceteris paribus* earnings premia corresponding to one-digit industry sector attachment, and the magnitude of the island's inter-industry wage dispersion. A key issue of interest within this research theme is the empirical investigation of the island's inter-industry wage structure to determine if it exhibits evidence of stability and persistence over the period reviewed here.

This chapter, in addressing the key research questions of the thesis, also examines the sub-themes of public sector wage premium and gender pay gap in St.Lucia. The preceding sub-themes are analysed over time to determine if any changes have occurred and situate these in the context of economic and social occurrences in St. Lucia over the corresponding time periods.

The organization of the chapter follows. The next section provides the contextual background on, social, macro-economic and labour market issues in St. Lucia. A subsequent section describes the empirical results and a final section offers some concluding remarks.

Background

In the early 1990s, agriculture accounted for about one-tenth of measured Gross Domestic Product (GDP) in St.Lucia, with industry and services representing about one-fifth and three-fifths respectively (see table 6.1). A transformation in the global trading landscape led to stiff international competition and the elimination of trade preferences into EU markets for the main export commodity of bananas. Moreover, the vulnerability of the sector to climatic conditions also undermined the role of agriculture as one of the island's key economic sectors. By 2004, the contribution of agriculture to GDP had more than halved compared to the 1990s with services now accounting for roughly three-quarters of the island's GDP (see table 6.1).

Table 6.1. Selected Macroeconomic and Social Indicators for St.Lucia

	1996	2004
Population and Demography		
Population (total)	147,062	162,311
Life expectancy at birth (years)		
Male	69.5	71.0
Female	73.7	74.1
Infant Mortality rate (per thousand live births)	16.7	18.9
Unemployment rate	16.3	21
Emigration rate of tertiary educated (% of tertiary educated population) 1/	68.6	n/a
Economic Indicators		
Real per capita GNP (EC$)	10,027	12,369
Inflation Rate	0.9	1.5
Banana export receipts (percent GDP)	8.2	2.5
Tourism services receipts (percent GDP)	11.3	13.6
Public sector debt (percent of GDP)	24.9	66.1
National Accounts		
Growth rate of GDP (annual percent change)	1.3	4.8
GDP by Economic Activity (share of total in percent)		
Agriculture and mining	11.0	4.9
Manufacturing, construction and utilities	17.6	19.2
Services	70.4	73.9

Source: Government of St. Lucia Statistical Office at www.stats.gov.lc.; ILO and World Bank, World Development Indicators

Notes:

(a) 1/ Data for 2000.

(b) Data not available

A discussion on the economic indicators for St.Lucia is pertinent as a backdrop to understand the subsequent empirical results. The real per capita GDP for St.Lucia situates the country in the range of middle income economies. Inflation is low and

mirrors the movement in prices in main international trading partners. The contribution of banana export receipts over time registered a steady decline moving from 8.2 percent of GDP in 1996 to 2.5 percent in 2004. Meanwhile, tourism services correspondingly increases and partially offsets the decline in agricultural output. The effects of slowdowns in global economies in the early 2000s has meant an enhanced impetus on the part of the government to spur economic growth, thus resulting in a more than doubling in public sector debt as a percent of GDP in 2004 compared to 1996.

In spite of the challenges associated with re-structuring, the social indicators for St. Lucia remain good with low levels of adult illiteracy, strong health indicators, lengthy life expectancy at birth, universal access to primary education, and relatively equitable access to social services. St. Lucia has traditionally had a low incidence of poverty by the standards of developing countries but the decline in the agricultural sector has led to an increase in poverty (see CDB 2006). Recent studies classified a quarter of St. Lucian households as being poor and about 1.2 percent as indigent with most of this poverty concentrated in rural areas and within the subset of female-headed households (see CDB 2006).

The unemployment rate in St. Lucia has worsened by an estimated 10 percentage points from 1996 to 2004. The prevalence of unemployment is consistently higher among women. For example, from 1996 to 2004 the female unemployment rate rose from 19 percent to 31 percent, given an average unemployment rate of 25 percent (see table A.6.2). Unemployment is a challenge that confronts many of the Caribbean countries including St.Lucia, where the unemployment rates are persistently in double-digits as in Dominica. The labour force participation rate has been expanding on a temporal basis with notable increases for women. The results on the rates of return will prove instructive on reporting on the rewards to education in the St.Lucia labour market in the presence of high unemployment.

The new trading regime for the export of bananas from African, Caribbean and Pacific (ACP) countries to the EU led to a reduction in market access and the introduction of a quota system in the early 1990s (see IMF 2002). The combined and subsequent effects of reduced access to the EU market, severe drought conditions, hurricanes Lenny and Ivan and tropical storm Lilli, the yellow sigatoka plant disease, declining world market

prices, and increases in the cost of inputs led to a significant contraction in the island's banana production capacity with obvious implications for that sector's employment (see IMF 2002; Government of St.Lucia 2004).

By the early 1990s receipts from tourism had outpaced agricultural earnings, rendering tourism the main foreign exchange earner. However, the sector has proven extremely vulnerable to external shocks and the exposure stems from increased competition from low-priced tourism destinations; the annual likelihood of hurricanes with implications for damage to hotel plants; and the effects of economic conditions and the imposition of domestic policies in source markets. St. Lucia has in the recent past experimented with the financial offshore sector, but entry into the sector was relatively late compared to other islands in the region. St. Lucia and St. Kitts were the final Organisation of Eastern Caribbean States (OECS) member states to introduce offshore legislation in the late 1990s (Suss, Williams and Mendis 2005). However, the island's temporary relationship with the sector was generally viewed as costly and yielded little benefit to the St.Lucian economy.

The government of St.Lucia has drafted its medium term economic strategy to address, *inter alia*, the challenges of labour displacement from the agricultural sector, competitiveness in the tourism sector, private sector development, and public sector reform. There has been some success in the implementation of the reform process.[1] However, in order to combat the decline in economic activity in the early 2000s the government pursued an expansionary fiscal policy resulting in an increased public sector debt representing 66.1 percent of GDP in 2004 (see table 6.1). In fiscal year 2003/04, the government also paid an estimated 15 million Eastern Caribbean dollars to public sector workers in the form of retrospective payments linked to the outcomes of historical salary negotiations.

It is clear that the implementation of these reform policies has potential implications for the structure of labour market earnings in St.Lucia. The government has generally adopted a laissez-faire approach to the labour market in St.Lucia. It is widely acknowledged that labour market regulations and increased levels of unionization impose increased labour costs on employers. Such demand-side constraints are not found to be prevalent in the Eastern Caribbean (ECLAC 2005). In St. Lucia, a

Minimum Wage Act (1999) has been promulgated but not implemented and national insurance contributions paid by the employers are not excessively prohibitive, with the 10 percent contribution equally divided between employers and employees. Thus, labour market institutions exert a minimal influence on the functioning of the St.Lucia labour market.

An understanding of labour market trends and challenges, macroeconomic and social indicators sets the framework for interpreting the empirical results below. The preceding sections for St.Lucia provide the necessary background to interpret and contextualize the rewards to educational attainment, inter-industry wage structure and to a lesser but also important extent the effects of the public sector pay premium and the gender pay gap.

Empirical Results

The regression estimates for the basic Mincerian earnings function are reported in table 6.2 for both years. The estimates are reported for models using data pooled across both gender groups. However, Wald tests supported the separation by gender for both years and separate models are also reported.[2] There is evidence of employment selection effects for all three samples in 1996. However, in 2004, only the male sub-sample shows evidence of employment selection and in addition, exhibits a change in sign relative to the initial year. The sign change may be attributable to the changing nature of selection effects given the increased incidence in unemployment over the two time periods.[3] The reported goodness-of-fit measures are comparable to those obtained for other developing countries in the Caribbean (for example, see Horowitz and Schenzler 1999 for Suriname; and Griffith 2001 for Barbados) and the estimated effects for the regression coefficients are generally compatible with the predictions of human capital theory.

The estimates for the linear and quadratic terms in age are well determined except for males in 2004. In 1996, monthly earnings for all individuals in the sample are maximized at an average age of 45 years. A breakdown by gender also gives the same turning point for both males and females. In 2004, the average age at which monthly

earnings are maximized increases to 47 years on average for the full sample and the female sub-sample. An indeterminate result on the maximizing age is found for males in 2004 as both linear and quadratic effects are poorly determined.

In 1996, unlike 2004 the estimated tenure effects are statistically significant for those with one or more years of job market experience. Thus, in 1996 individuals with job tenure over one year, but less than five years earn, on average and *ceteris paribus,* 24.2 more in monthly earnings than someone in the reference group with job tenure of under six months. The rewards increases in relation to length of job tenure, and an individual with job tenure in excess of ten years receives a monthly earnings premium of 52.0 percent compared to someone in the base group, on average and *ceteris paribus*. The monthly earnings premium for females is quite large, for example females with five to ten years of job market experience receive on average and *ceteris paribus* 44.2 percent more in earnings than a female in the reference group. The reward becomes even larger for females with ten or more years of job tenure, with earnings on average and *ceteris paribus*, 62.1 percent above females with six months or less job tenure. The magnitude of the rewards attributed to job tenure declines over time. In 2004, the estimated tenure effects are now only statistically significant for tenure of five years and beyond for all except females, who still receives monthly premiums at a slightly lower rate than in the earlier period. In 2004, the level of monthly earnings premiums accruing to individuals with ten or more years of job tenure has declined from the earlier years, with the contraction greatest for males. Nevertheless, individuals with ten or more years of job tenure are amply rewarded and receive, on average and *ceteris paribus*, 43.7 percent higher monthly earnings compared to someone in the reference group.

Table 6.2. Interval Regression Model Estimates for Basic Mincerian Log Monthly Earnings Specifications

Variables	1996			2004		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	2.5658***	2.6128***	2.4593***	3.8772***	4.1753***	3.5498***
	(0.2922)	(0.3605)	(.4526)	(0.4380)	(0.5888)	(.6389)
Age	0.0638***	0.0633***	0.0914***	0.0280**	0.0188	0.0472**
	(0.0096)	(0.0130)	(0.0160)	(0.0129)	(0.0174)	(0.0198)
Age^2	-0.0007***	-0.0007***	-0.0010***	-0.0003*	-0.0002	-0.0005**
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Male	0.4309***	†	†	0.2164***	†	†
	(0.0336)			(0.0374)		
Primary	0.1359***	0.1012*	0.2028***	0.2478***	0.2976***	0.1162
	(0.0461)	(0.0601)	(0.0716)	(0.0655)	(0.0775)	(0.1265)
Secondary Incomplete	0.3127***	0.1769	0.4084***	0.3672***	0.3370**	0.3160*
	(0.0939)	(0.1361)	(0.1269)	(0.1069)	(0.1428)	(0.1698)
Secondary	0.6528***	0.4807***	0.8533***	0.6147***	0.6255***	0.5638***
	(0.0562)	(0.0757)	(0.0832)	(0.0772)	(0.0989)	(0.1385)
Tertiary	1.0956***	0.8492***	1.3382***	1.0325***	0.8301***	1.1488***
	(0.0751)	(0.1239)	(0.0944)	(0.0878)	(0.1135)	(0.1534)
Other	0.7345***	0.8304***	0.5558*	0.4109**	0.5526*	0.2225
	(0.1702)	(0.1177)	(0.3169)	(0.1630)	(0.2841)	(0.1665)
University	1.3494***	1.1741***	1.6526***	1.3351***	1.3533***	1.3463***
	(0.0770)	(0.0974)	(0.1160)	(0.1006)	(0.1326)	(0.1744)
Tenure_2	0.0529	0.0328	0.1321	0.0834	0.0953	0.0872
	(0.0843)	(0.1009)	(0.1356)	(0.0921)	(0.1342)	(0.1227)
Tenure_3	0.2171***	0.1952***	0.2943***	0.1057	0.0339	0.1993**
	(0.0581)	(0.0713)	(0.0887)	(0.0731)	(0.1062)	(0.0927)
Tenure_4	0.2684***	0.2271***	0.3661***	0.2935***	0.1962*	0.4067***
	(0.0613)	(.0754)	(0.0955)	(0.0775)	(0.1098)	(0.1007)
Tenure_5	0.4186***	0.3979***	0.4830***	0.3625***	0.2888***	0.4602***
	(0.0632)	(0.0778)	(0.0982)	(0.0780)	(0.1072)	(0.1083)
Log(Hours)	0.5483***	0.6731***	0.3714***	0.4792***	0.5330***	0.4278***
	(0.0603)	(0.0751)	(0.0911)	(0.0776)	(0.1141)	(0.0978)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	0.1543***	0.1729*	0.3045***	-0.1017	-0.1651*	0.0444
	(0.0591)	(0.0905)	(0.0336)	(0.0694)	(0.0958)	(0.1103)
Survey Round Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.3652	0.3420	0.4207	0.3561	0.3223	0.4201
McFadden R^2	0.1249	0.5173	0.6138	0.1212	0.5139	0.6129
Pseudo Log-Likelihood	-3127.161	-1724.896	-1380.184	-2027.835	-1123.802	-895.052
σ	0.5919	0.6026	0.5654	0.5556	0.5700	0.5273
Sample Size	2094	1112	982	1362	730	632

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

Rate of Returns to Educational Qualifications

The estimates for the private rates of return to the set of educational qualifications are derived using the coefficients from the basic Mincerian functions reported in table 6.2 in conjunction with expression [5] in chapter 4. The rate of return estimates are presented

in table 6.3 for the pooled and the separate male and female samples. In 1996 the estimated annualized rates of return increase almost monotonically with the qualification level, though for 2004 this is not the case for the female sub-sample. The average (marginal) returns to educational qualifications for females are numerically higher at all educational levels than the comparable rates for males. However, the gender differences in the point estimates are only found to be statistically significant at a conventional level for secondary qualifications in 1996 and for the tertiary qualifications in 2004. Overall, the findings suggest that the labour market in St. Lucia rewards qualifications at all educational levels. However, there is evidence of more sizable labour market returns to the set of tertiary and university qualifications for both gender groups.

Table 6.3. Annualized Rates of Return to Educational Qualifications

Qualifications	**Rates**					
		1996			**2004**	
	All	Male	Female	All	Male	Female
Primary	0.0194***	0.0145*	0.0290***	0.0354***	0.0425***	0.0166
	(0.0066)	(0.0086)	(0.0102)	(0.0094)	(0.0111)	(0.0181)
Secondary	0.1034***	0.0759***	0.1301***	0.0734***	0.0656***	0.0895***
	(0.0074)	(0.0105)	(0.0102)	(0.0090)	(0.0130)	(0.0127)
Tertiary	0.2214***	0.1843***	0.2424***	0.2089***	0.1023**	0.2925***
	(0.0334)	(0.0592)	(0.0370)	(0.0282)	(0.0420)	(0.0374)
University	0.2322***	0.2311***	0.2664***	0.2401***	0.2426***	0.2609***
	(0.0245)	(0.0314)	(0.0356)	(0.0261)	(0.0390)	(0.0376)

Notes:
(a) The calculations are based on the basic Mincerian equation from table 6.2.
(b) See expression [5] in chapter 4 for the relevant formula to derive the rates of return.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) The duration of primary schooling is assumed seven years; secondary schooling is assumed five years; a tertiary course is assumed two years; a university degree is assumed three years.
(e) The standard errors are reported in parenthesis.

A set of t-ratios are computed to determine if there are any statistically significant temporal differences in the returns over time by educational level. The statistically significant temporal changes in the rates of return to educational qualifications by gender group are confined to primary qualifications for men ($|t| = 2.00$) and secondary qualifications for women ($|t| = 2.50$). In particular, the rate of return to the primary qualification for men, while remaining very modest rose about three-fold between 1996 and 2004. Thus, males in the 1996 sample having primary education earned significantly less than males with primary education in 2004. The return to secondary qualifications contracted by almost one-half for women over the two time periods. A

conjecture is that the reduction in the female return to the secondary qualifications may be linked to an increased supply of females within the secondary educational category relative to the demand for this category of worker. Table 3.4 of chapter three reports the share of employed women with secondary education as rising by over one-fifth between 1996 and 2004. If demand for such secondary educated women rose less sharply, this could result in the observed contraction in the return to this particular qualification. Given the sharp rise in female unemployment noted over the period reviewed here, the increase in the share of women with secondary education may reflect the selective withdrawal or 'shake-out' of less qualified women with primary education or less from employment in the St.Lucia labour market.

The rate of return for those in the full sample and educated to the secondary level (|t| = 2.6) on a temporal basis is also statistically significant. The result suggests that secondary educated individuals earned more in 1996 than in 2004 with the returns to education contracting by about one-third in 2004 in relation to the earlier period. The t-statistics for the differences in the rates of return to education are presented in table 6.4.

Table 6.4. T-statistics for Differences in Rates of Return

	1996 All vs 2004 All	1996 Male vs 2004 Male	1996 Female vs 2004 Female	1996 Male vs 1996 Female	2004 Male vs 2004 Female
Primary	-1.3972	-2.0016**	0.5957	-1.0863	1.2226
Secondary	2.5645***	0.6161	2.4975***	-3.6948***	-1.3176
Tertiary	0.2868	1.1291	-0.9526	-0.8331	-3.3826***
University	-0.2221	-0.2288	0.1078	-0.7437	-0.3373

The private rates of return to educational qualifications reported for St.Lucia in this chapter are broadly comparable to the estimates obtained by Coppin (1996a) and Griffith (2001) for Barbados, and Bedi and Born (1995) for Honduras. The returns to education are also similar to those obtained for Dominica (see chapter 5), which, given its neighbouring geographical location, is to be anticipated. The returns for secondary, tertiary and university qualifications for Dominica in 1999, estimated commonly across both gender groups and expressed in log points, were 0.11, 0.15 and 0.17 respectively. A comparison of these returns with the 1996 estimates obtained for St. Lucia in the current study, the estimated differences in returns between the three educational

categories are not found to be statistically different from zero across the two islands. The absolute values for the relevant t-ratios in this case are 0.48, 1.47 and 1.37 for secondary, tertiary and university respectively.

The findings in this chapter, and in the chapter 5 for Dominica, vary to some degree from the traditional pattern reported in the empirical literature for developing countries, which suggests that returns to education are highest at the primary level (see Psacharopoulos and Patrinos 2004). In this chapter, and similarly in Griffith (2001), Bedi et al. (1995), and Coppin (1996a), the results for the rates of return suggest that returns in Caribbean countries are more in line with those obtained for the set of Organisation for Economic Cooperation and Development (OECD) countries (see Machin and Stevens 2004) and are in fact lowest for primary education.

In St. Lucia, the rate of return to primary education for females in 1996 is slightly higher than for males. In 2004, the rate of return to primary education for women contracts and is statistically insignificant while that of men increases over time and surpasses the observed rate for females. The empirical literature (see Psacharopoulos et al. 2004) posits the lower rates of returns to females in developing countries as a policy concern. However, in the case of St. Lucia, this emphasizes a different sort of policy concern as females are more educated than their male counterparts. The statistically insignificant rate of return for primary educated females perhaps indicates abundance in the labour market of primary educated females relative to the demand for such labour.

Inter-industry wage structure

The industry effects are now separately investigated using expression [8] outlined in Chapter 4 and the results are reported in table 6.5 using estimates from the pooled models as well as those from the gender-specific models.[4] The results for 1996 show that the 'transport', 'finance', utility', 'construction', and 'hotels' industries exhibit sizeable pay premia relative to the employment weighted average. In contrast, the 'agricultural', 'manufacturing', 'domestic services' and 'social services' sectors are found to be below the average with earnings in these sectors ranging from between 10 to 30 percent below the employment weighted average.

In the 1990s, the construction sector registered exceptional growth due in part to private sector and public sector construction projects. In 2004, growth in private sector construction was buoyant particularly in tourism infrastructure and residential buildings. The expenditure by the public sector on economic infrastructure was high as the government embarked on comprehensive public sector investment projects as a means to spur economic growth following the economic recession in the preceding years (see Government of St.Lucia 2004a). The combined construction activity within the public and private sector contributed to the maintenance of the premium to employees in the construction industry with rents 21.7 percent above the employment weighted average in the latter period. The increased expenditure by the government on infrastructure investment projects is not reflected in the public sector premium as the projects are undertaken by private contractors.

The below average estimates for the agricultural sector likely reflects the impact of reduced access to the EU market for the island's agricultural products. Also, adverse weather conditions, not least the passage of Hurricane Ivan in September 2004 and yellow sigatoka (or leaf spot disease) infestation leading to lower banana output and subsequently a decline in employment and earning in this sector. Based on the pooled sample, the estimated disadvantage for the agriculture sector relative to the average has widened by a statistically significant 0.12 log points between 1996 and 2004. The absolute t-ratio for this differential over time is computed at 2.1. However, the gender-specific differentials over time are not found to be statistically distinguishable from zero with absolute t-ratios of 1.4 and 1.3 for the male and female samples respectively.

The *ceteris paribus* pay premium for those in the 'hotels' industry group has also contracted sharply relative to the average between 1996 and 2004, and by the latter year was statistically indistinguishable from the economy-wide average. The absolute values for the computed t-ratios for the temporal differences are 2.7, 2.1 and 1.8 for the pooled, male and female samples respectively.

The 'finance' sector, however, yields substantial rewards for both gender groups in both years. The pay rewards for those employed in the 'social services' sector appeared to have converged on the economy-wide average by 2004. There is also some very

tentative evidence of a temporal improvement in the relative pay position of 'public administration' employees, though it should be stressed that some of the 'public administration' effect may have been absorbed by the 'government' control introduced into the augmented regression model reported in table 6.7. This finding may partly reflect the generous settlements agreed by the government in its pay negotiation with public sector employees in the early 2000s.

Employment in the manufacturing sector has undergone a decline over the periods under review. In general during the two time periods, earnings in the sector are below the employment weighted average. However, females consistently fare the worse in that sector as more females than males are employed in the sector. In 2004, while the earnings of males are not statistically different from the economy-wide average, females in the manufacturing sector on average and *ceteris paribus*, were paid about 18.2 percent less than the female average. The manufacturing sector is affected by stiff regional competition, fluctuations in energy prices and high regional shipping costs (see Government of St.Lucia 2004a). The government being mindful of the economic importance of the sector for employment generation, economic diversification and food security extends a range of fiscal incentives to the sector. Firms in receipt of fiscal incentives use these to improve capital stock and as a result productivity increases. Nevertheless, the access of manufacturing firms to these incentives has not been seen to raise wages, particularly of male workers, above the average.

Women in 'domestic services', on average and *ceteris paribus*, were paid about 25 percent less than the female average in both years. This sector rivals agriculture in terms of the magnitude of its low pay penalty relative to the average. 'Domestic services' accounts for about seven percent of total female employment on the island and, though there may be some non-financial benefits associated with engagement in this activity to off-set the relatively low earnings. In St.Lucia, the poor nature of female pay in this sector is a potential source of concern. This finding is resonant of that detected for Dominica in chapter five and clearly identifies a sector that contributes to gender pay disadvantage in both islands.

Table 6.5. Inter-industry Earnings Deviations

One-Digit Industry Sector	1996 Deviation from Average			2004 Deviation from Average		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Agriculture	-0.2149***	-0.2641***	-0.1336**	-0.3374***	-0.3585***	-0.2756***
	(0.0350)	(0.0418)	(0.0603)	(0.0458)	(0.0539)	(0.0857)
Manufacturing	-0.1098***	-0.0555	-0.1257***	-0.0792	0.1391	-0.2006***
	(0.0360)	(0.0682)	(0.0424)	(0.0662)	(0.1086)	(0.0741)
Utility	0.2438**	0.2040**	0.2084	0.3920**	0.5131***	-0.3501
	(0.0948)	(0.1044)	(0.1682)	(0.1700)	(0.1729)	(0.2163)
Construction	0.2219***	0.1803***	0.4154***	0.1967***	0.1530***	0.2236
	(0.0386)	(0.0393)	(0.1127)	(0.0475)	(0.0485)	(0.1491)
Retail	-0.0100	0.0198	-0.0127	0.0326	0.0242	0.0500
	(0.0374)	(0.0590)	(0.0475)	(0.0381)	(0.0602)	(0.0483)
Hotels	0.1900***	0.2036***	0.1935***	0.0387	0.0336	0.0566
	(0.0382)	(0.0567)	(0.0515)	(0.0408)	(0.0596)	(0.0578)
Transport	0.2661***	0.2371***	0.2963***	0.1335*	0.1441*	0.1582
	(0.0520)	(0.0562)	(0.1077)	(0.0703)	(0.0794)	(0.1366)
Finance	0.2553***	0.2985***	0.1747*	0.1873***	0.1598*	0.2014**
	(0.0644)	(0.0819)	(0.1015)	(0.0632)	(0.0900)	(0.0877)
Public Administration	0.0745	-0.0594	0.1851**	0.1125**	0.1001	0.1091
	(0.0567)	(0.0803)	(0.0798)	(0.0557)	(0.0858)	(0.0728)
Social Services	-0.1727***	-0.3632***	-0.1086	-0.0053	-0.0944	0.0516
	(0.0631)	(0.1018)	(0.0735)	(0.0506)	(0.0800)	(0.0628)
Domestic Services	-0.3576***	-0.4244***	-0.3039***	-0.3321***	-0.4222**	-0.2776***
	(0.0622)	(0.1023)	(0.0691)	(0.0733)	(0.1708)	(0.0790)
Overall Variability (Krueger & Summers)	0.1845	0.2030	0.1705	0.1820	0.2047	0.1582
Overall Variability (Haisken-DeNew & Schmidt)	0.1787	0.1939	0.1573	0.1736	0.1909	0.1394

Notes:
(a) The calculations are based on the augmented equations from table 4.
(b) See expression [8] in chapter 4 for the relevant formula.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) See text for the computation of the overall variability measures.
(e) The inter-industry wage structures for men and women were computed from the gender-specific log earnings equations.
(f) The Duncan & Duncan index of industrial dissimilarity = 0.3385 in 1996 and 0.3080 in 2004. This is computed as half the sum of the absolute gender differences in the one-digit industry proportions.

There is strong degree of persistence in the rankings of the 11 one-digit industries over time, though the correlation in rankings is weaker for the female industrial wage structure. The Spearman rank order correlation coefficient in industry rankings between 1996 and 2004 is 0.89 for the pooled sample, 0.84 for the male sample, and 0.59 for the female sample. The prob-value of 0.056 for the latter correlation coefficient places it on the cusp of statistical significance from zero in this case.

Based on the results from the Duncan and Duncan (1955) dissimilarity index (see notes to table 6.5), there is evidence of gender segregation at the one-digit industry level in both 1996 and 2004. This finding for St.Lucia is similar to that for Dominica in chapter

five and also as evidenced in the empirical literature by Olsen and Coppin (2001) for Trinidad and Tobago.

Table 6.6. St. Lucia T-statistics for differences in inter-industry differentials between 1996 and 2004

Industry	1996 versus 2004		
	All	**Male**	**Female**
Agriculture	2.1267**	1.3847	1.3548
Manufacturing	-0.4057	-1.5166	0.8774
Utility	-0.7613	-1.5306	2.0387**
Construction	0.4121	0.4389	1.0259
Retail	-0.7981	-0.0516	-0.9254
Hotels	2.7098***	2.0658**	1.7685*
Transport	1.5163	0.9562	0.7938
Finance	0.7537	1.1401	-0.1991
Public Administration	-0.4786	-1.3575	0.7030
Social Services	-2.0703**	-2.0760**	-1.6573*
Domestic Services	-0.2649	-0.0114	-0.2505

The use of t-ratios to investigate the magnitude of the temporal changes in the inter-industry differentials finds statistically significant results within the pooled sample for 'agriculture' ($|t| = 2.1$), and 'hotels' ($|t| = 2.7$). The finding for 'agriculture' purports greater earnings premium in 1996 as compared to 2004 and this finding is conceivable and directly in line with the changes in the agriculture sector. Recall in the 1990s the exports of bananas were at a peak, with strong prices and favourable exchange rates between the pound sterling and the Eastern Caribbean dollar. Using the words of Mighty Sparrow, a regional calypsonian, bananas were 'green gold' in the 1990s. However by the 2000s, the evolution of trade liberalisation, the effects of the global economic slowdown, weather conditions and pest infestation contributed to the contraction in agricultural output and earnings.

The earnings in 'social services' as reported by the t-statistics for differences in inter-industry differentials is statistically significant, with earnings in 2004 greater relative to the average than in the earlier time period. This is expected given the Government of St.Lucia emphasis in the interval period on meeting the Millennium Development Goal of universal primary education and moving beyond to attain universal secondary

education. Also, employees within social services were in receipt of retrospective payments which may have contributed to the greater earnings in 2004 vis-à-vis earnings in the former period (see IMF 2005).

The estimate for the overall variability in inter-industry wage dispersion is relatively high at about 0.18 regardless of the measure used. However, the overall variability in the inter-industry wage dispersion appears relatively stable over time with a very modest reduction observed for female dispersion. This finding places St.Lucia closer to the United States and the United Kingdom, where the wage dispersion is similarly high.

Public Sector Wage Premium and Gender Pay Gap

The basic Mincerian earnings functions are now augmented to include controls for industry, district and employment type. The results for the augmented specification for 1996 and 2004 are reported in table 6.7 for both the pooled sample and again separately by gender group.[5]

In St. Lucia, the empirical results suggest that remuneration in the public sector is not statistically different from earnings in the private sector base group. However, the gender-specific equations suggest that the public sector pay premium with respect to the private sector in 1996 is confined to men but this is reversed by 2004 where a female pay advantage emerges. The public sector pay premium in St.Lucia is weaker than observed in Dominica. In the case of Dominica, statistically significant public sector premium are found for the full sample and for males, thus pointing to a pay advantage for attachment to the public sector and it is not as clear cut for St.Lucia. In Dominica, for example in 2002, the public sector wage bill accounted for 15 percent of GDP as compared to 11 percent of GDP in St.Lucia (see World Bank 2005b). The higher ratio may explain the more generous public sector pay settlements in Dominica compared to St.Lucia.

Table 6.7. Interval Regression Model Estimates for Augmented Log Monthly Earnings Specifications

Variables	1996			2004		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	4.5605***	4.7002***	4.3684***	4.0553***	4.6119***	3.1984***
	(0.3344)	(0.3749)	(0.5171)	(0.4427)	(0.6551)	(0.5920)
Age	0.0096	0.0126	0.0181	0.0289**	0.0251	0.0554***
	(0.0104)	(0.0124)	(0.0182)	(0.0137)	(0.0190)	(0.0206)
Age^2	-0.0000	-0.0001	-0.0001	-0.0003*	-0.0003	-0.0006**
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Male	0.1933***	†	†	0.1664***	†	†
	(0.0387)			(0.0372)		
Primary	0.0839*	0.0798	0.0964	0.1133**	0.1521**	0.0652
	(0.0464)	(0.0566)	(0.0691)	(0.0578)	(0.0682)	(0.1220)
Secondary Incomplete	0.3735***	0.2620**	0.4491***	0.2083**	0.2532*	0.1142
	(0.0948)	(0.1227)	(0.1109)	(0.1028)	(0.1370)	(0.1646)
Secondary	0.4223***	0.3408***	0.5079***	0.3842***	0.4209***	0.3867***
	(0.0594)	(0.0749)	(0.0848)	(0.0724)	(0.0935)	(0.1323)
Tertiary	0.7670***	0.6621***	0.8551***	0.7776***	0.6972***	0.8974***
	(0.0784)	(0.1210)	(0.1017)	(0.0876)	(0.1139)	(0.1528)
Other	0.7029***	0.7551***	0.5827**	0.1989	0.3071	0.1399
	(0.1524)	(0.1459)	(0.2642)	(0.1348)	(0.2300)	(0.1797)
University	1.0031***	0.9289***	1.1379***	1.1186***	1.2504***	1.1442***
	(0.0803)	(0.1043)	(0.1236)	(0.1022)	(0.1376)	(0.1677)
Tenure_2	0.0811	0.0402	0.1529	0.1063	0.1215	0.0852
	(0.0838)	(0.0921)	(0.1209)	(0.0872)	(.1301)	(0.1087)
Tenure_3	0.2359***	0.1946***	0.2956***	0.1613**	0.1021	0.2304***
	(0.0567)	(0.0713)	(0.0815)	(0.0678)	(0.1009)	(0.0850)
Tenure_4	0.3097***	0.2450***	0.3895***	0.3021***	02146**	0.3989***
	(0.0614)	(0.0763)	(0.0889)	(0.0732)	(0.1052)	(0.0927)
Tenure_5	0.5258***	0.5176***	0.5101***	0.3983***	0.3689***	0.4259***
	(0.0655)	(0.0834)	(0.0933)	(0.0743)	(0.1047)	(0.1005)
Log(Hours)	0.3767***	0.4026***	0.3502***	0.4289***	0.4168***	0.4338***
	(0.0638)	(0.0672)	(0.0859)	(0.0759)	(0.1208)	(0.0888)
Government	0.1162	0.1937**	0.0576	0.0561	-0.0499	0.1748*
	(0.0724)	(0.0855)	(0.0922)	(0.0664)	(0.0955)	(0.0920)
Self-employed	0.1688***	0.1927***	0.1386**	0.1169**	0.0482	0.2122**
	(0.0438)	(0.0522)	(0.0626)	(0.0527)	(0.0640)	(0.0972)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.2426***	-0.2045**	-0.2119*	-0.0594	-0.1057	0.1389
	(0.0677)	(0.0908)	(0.1135)	(0.0750)	(0.1035)	(0.1148)
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes	Yes	Yes
Survey Round Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.4897	0.4797	0.5253	0.4510	0.4354	0.5175
McFadden R^2	0.1834	0.5514	0.6383	0.1647	0.5406	0.6360
Pseudo Log-Likelihood	-2917.840	-1603.096	-1292.619	-1931.290	-1062.150	-841.518
σ	0.5307	0.5358	0.5119	0.5130	0.5203	0.4809
Sample Size	2094	1112	982	1362	730	632

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) † denotes not applicable in estimation

The t-statistics for temporal changes in the public sector premium finds statistically significant point estimates for the male sample of (|t| = 1.9) (see table 6.9). The self-employed earn on average and *ceteris paribus*, 16.9 percent more than individuals in private sector wage employment using the pooled estimates. Over the two time periods

the magnitude of the self-employed earnings differential appears stable, though the female self-employed tend to fare better than the female private sector wage employed than is the case for men using a similar comparison in the most recent year available.

Table 6.8. St. Lucia Public Sector Pay Premium and Gender Pay Gap

	1996			2004		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Public Sector Pay Premium						
Raw (or unadjusted) Public sector pay premium	0.4735*** (0.0439)	0.4078*** (0.0607)	0.5352*** (0.0595)	0.4526*** (0.0476)	0.2650*** (0.0698)	0.6390*** (0.0636)
Ceteris paribus (or adjusted) public sector pay premium 1/	0.1162 (0.0724)	0.1937** (0.0855)	0.0576 (0.0922)	0.0561 (0.0664)	-0.0499 (0.0955)	0.1748* (0.0920
Gender Pay Gap						
Raw (or unadjusted) gender pay gap	0.3654*** (0.0324)	†	†	0.1448*** (0.0385)	†	†
Ceteris Paribus (or adjusted) gender pay gap 2/	0.4309*** (0.0336)	†	†	0.2164*** (0.0374)	†	†
Ceteris Paribus (or adjusted) gender pay gap 3/	0.1933*** (0.0387)	†	†	0.1664*** (0.0372)	†	†

Notes:
(a) 1/ reports the *ceteris paribus* public sector pay premium from the augmented specification.
(b) 2/ reports the *ceteris paribus* gender pay gap from the basic Mincerian specification.
(c) 3/ reports the *ceteris paribus* gender pay gap from the augmented specification.
(d) The public sector pay premium and the gender pay gap as reported in the table are the coefficients reported in log-points.
(e) † Implies not applicable to current specification.

The pooled sample estimates reveal a *ceteris paribus* gender pay gap for St.Lucia of the order of 21 percent in 1996 declining to 18.1 percent by 2004. However, the difference in point estimates between these two years for the augmented sample is not found to be statistically significant with a t-ratio of close to 0.5 in absolute terms. The gender pay advantage utilising the basic Mincerian specification (see table 6.8) is set at 53.9 percent on average and *ceteris paribus* in 1996, declining to about 24 percent on average and *ceteris paribus* in 2004. The computation of t-statistics for the temporal differences finds a statistically significant outcome ($|t| = 4.3$) (see table 6.9). The raw (or unadjusted) gender pay gap in 1996 is comparatively lower than the *ceteris paribus* pay gap, with a pay advantage of 44 percent in the absence of human capital and job tenure controls. This declines to a raw gender pay gap of 15.6 percent in 2004.

Table 6.9. St. Lucia T-statistics for differences in Public Sector Pay Premium and Gender Pay Gap

	1996 versus 2004		
	All	**Male**	**Female**
Public Sector Pay Premium	0.6111	1.8998*	-0.9000
Gender Pay Gap 1/	4.2647***	†	†
Gender Pay Gap 2/	0.5011	†	†

Notes:
(a) 1/ reports the t-statistics for differences for the basic Mincerian specification.
(b) 2/ reports the t-statistics for differences for the augmented specification.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Conclusions and Summary of Findings

The analysis of the labour market earnings determination process in St. Lucia revealed that the island's labour market places a sizeable valuation on post-secondary human capital assets. This valuation has remained relatively stable over time for both gender groups. In addition, the annualized rates of return for tertiary and university qualifications computed in this study are comparable to those prevailing in both the Caribbean and developed economies. In contrast, the returns to secondary level education have contracted for women between 1996 and 2004 but we conjecture that this may be linked to the relative increase in the supply of women with these qualifications in employment activity in St.Lucia compared to the rise in the relative demand for this labour quality.

The degree of inter-industry wage dispersion was found to be high when compared to most industrialized economies and reflected that prevailing in the United States and, not surprisingly, the neighbouring Caribbean island of Dominica. Labour market earnings in the agricultural sector declined relative to the average between 1996 and 2004 reflecting the impact of EU policy changes on the island's agricultural activity. There was also a strong gender dimension to the inter-industry wage structure and this appears to have become more acute over time. In particular, there was evidence that the female inter-industry wage structure changed more markedly than the male structure between 1996 and 2004. The implication this has for the gender disparity in pay is unclear, though there is limited evidence that it acts to actually widen the island's gender pay gap.

In spite of both economic re-structuring and other changes the island has undergone, the earnings determination process in St.Lucia appears to have been affected only very modestly. The gender pay gap, which is comparable in magnitude to that prevailing in other Caribbean islands,[6] exhibits a degree of stability, as do the returns to educational qualifications (with one notable exception for women) and the male industry wage structure. It is unclear whether public sector reforms have exerted any effect on the public sector pay premium, though there is some evidence that the premium for men relative to private sector wage employment has contracted between 1996 and 2004 while that for women has increased over the same period. Women may thus have been the greater beneficiaries of the public sector pay negotiations in more recent times.

It may be the case that the greater effects associated with the reform process are not being felt by those employed within the labour market but by the unemployed. There has been a rise in the island's unemployment (see table 6.1) and this embodies a very strong gender dimension. The nature of unemployment and its determinants clearly merits closer research attention in order to obtain a more complete understanding of the labour market impact of both the island's economic re-structuring and the array of policies contained within the overall program of government reforms. However, this issue is not pursued here.

ENDNOTES

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[1] The government has developed and implemented a broad array of initiatives including: the Banana Production Recovery Plan (September 1998); Private Sector Development Strategy (1998); Offshore legislation (December 1999); Education Sector Development Plan (2000); Income tax reduction (July 2001); Telecommunications Reform (May 2002); Fiscal Incentives for the manufacturing sector (annual); and an Interim Poverty Reduction Strategy (2003).

[2] The relevant Wald test for the null hypothesis of common parameters across gender groups for 1996 was computed at 147.0 (with 15 dfs) and 52.4 (with 17 dfs) for 2004. Both test values are statistically significant at the 0.01 level or better and thus imply rejection of the null hypothesis for each year.

[3] Probit results are included for information in table A.6.1. Again like in the case of Dominica, the perverse finding in regard to the selection effect may reflect the role of poor instruments.

[4] The null hypothesis of a common inter-industry wage structure across gender groups was tested in both years using Wald tests. The computed test value for 1996 (with 11 dfs) was found to be 13.5 (prob-value=0.19), while the test value for 2004 (with 11 dfs) was found to be 19.6 (prob-value=0.03).

[5] The relevant Wald test for the null hypothesis of common parameters across gender groups for 1996 was computed at 67.3 (with 41 dfs) and 68.1 (with 43 dfs) for 2004. Both test values are again statistically significant at the 0.01 level or better and thus imply rejection of the null hypothesis for each year. The Wald test results are reported in table A.6.2.

[6] For example, see Hotchkiss and Moore (1996) for Jamaica, Olsen and Coppin (2001) for Trinidad and Tobago.

CHAPTER 7: THE LABOUR MARKET EARNINGS DETERMINATION PROCESS IN BARBADOS

Introduction

Barbados is the easternmost island in the Caribbean archipelago and it has a past solely dominated by British colonization. The British settled in Barbados from 1627 until independence in 1966. The island's independence in 1966 placed Barbados in the league of the first few islands in the Eastern Caribbean to sever ties with Great Britain., though it still remained part of the Commonwealth.

The island unlike its neighbours is extremely flat and low-lying of coral and limestone formation and has a land area of approximately 431 square kilometres (166 sq. miles). The population stands at 270,700 persons with an estimated 90 percent of African descent and the remainder of white or mixed ethnicity (2001 census). The population density in Barbados is one of the highest in the Eastern Caribbean at 624 persons per square kilometre (see IMF 2004).

Barbados, like many of the other Eastern Caribbean countries has had a history of reliance on one crop as its main export commodity, in this case sugar cane. The preoccupation with sugar cane cultivation dates back to colonial times. The economic structure over the recent past has shifted towards a greater focus on services. For example, in 2003 the largest contributor to GDP is services (79.4 percent), followed by industry (16.1 percent) with the contribution of agriculture being small in comparison, at 4.5 percent. Tourism and offshore financial and international business services form the mainstay of the economy.

The structure of the remaining chapter is as follows. In section two further details on the social, economic and labour market infrastructure in Barbados are discussed. A subsequent section three presents the empirical findings of the study on the selected themes of rates of returns to education, inter-industry wage structure, public-private

sector pay premium, and the gender pay gap. Section four provides concluding remarks.

The Barbados Education System and Labour Market

The economic indicators for Barbados are generally positive with per capita GDP in 2003 of 10,694 United States dollars, thus categorizing Barbados as an upper middle income country (see table 7.1). In addition, inflation is low and GDP growth has been maintained at about 3.0 per cent on average from 1998, falling slightly in 2001-02, on account of the global economic recession.

Barbados also has strong social indicators, particularly in the area of education. As home to one of the main campuses of the University of the West Indies, the country has a large tertiary and university educated population. The Government of Barbados has recognised the important role of education in human capital development and poverty reduction and has put in place a comprehensive educational strategy including free access to tertiary education. Human development in Barbados is high. Barbados consistently ranks in the top 40 in the United Nation's Development Programme Human Development Index ranking of 177 countries; making it the third highest ranking country in the Western Hemisphere after the United States and Canada (see UNDP 2010). In addition, poverty is low and life expectancy is on par with rates in developed countries (see table 7.1).

Labour market indicators are quite good, with unemployment mostly in single digits in more recent times. Unemployment is highest among the youth and women, a common feature of Caribbean labour markets. Males on average typically have higher labour force participation rates than females but on a temporal basis the gap in female participation in the labour market is closing (see table A.7.1). By Caribbean standards, the participation of females in the Barbados labour market is high at 76 percent (IMF 2004).

Table 7.1. Selected Macroeconomic and Social Indicators for Barbados

	1999	2003
Population and Demography		
Population (total)	285,243	289,834
Life expectancy at birth (years)	75.79	75.04
Emigration rate of tertiary educated (% of tertiary educated population) 1/	62.64	n/a
Economic Indicators		
Real per capita GDP (current US$)	9,776	10,694
Inflation Rate	1.56	1.62
Agriculture value added (percent GDP)	6.25	4.47
Manufacturing value added (percent GDP)	9.37	6.75
Services value added (percent GDP)	72.20	79.42
Public sector debt (percent of GDP)		
GDP by Economic Activity (share of total in percent)		
Agriculture, value added (percent of GDP)	6.25	4.47
Industry, value added (percent of GDP)	21.56	16.12
Services	72.20	79.42

Source: World Bank, World Development Indicators; IMF World Economic Outlook
Notes:
(a) 1/ data for latest available year, 2000
(b) Data not available

The economic and social indicators for Barbados differ in some respects to those in Dominica and St. Lucia. The educational indicators are strong on account of focused government policy and an appreciation of this will be instructive in understanding the rates of return to education. Of the three countries analysed in the thesis, the Barbados public sector is the largest as a proportion of the labour force. Moreover, public sector employment has remained stable over time. In general, the empirical analysis on the rates of return to education, the inter-industry wage structure, public sector pay premium and the gender pay gap will provide a comprehensive insight of these themes for Barbados.

Empirical Results

The regression results for the basic Mincerian earnings function by gender for 1999 and 2003 are given in table 7.2. The justification for disaggregating the regression models by gender is provided by Wald tests.[1] The goodness-of-fit measure, the adjusted R-squared values are satisfactory, with slightly more than one-quarter and roughly two-fifths of the variation in the earnings explained by the controls for human capital, age and gender, in 1999 and 2003 respectively. In 2003, the goodness-of-fit measures are amplified with more than two-fifths of the variation in log earnings explained by the explanatory variables included in the basic Mincerian equation.

In both years the concave relation in the linear and quadratic terms for age exhibits the correct signs. In 1999, the age turning point for the pooled basic Mincer sample is estimated at about 52 years, and at 54 years for males and 47 years for females. In 2003, the age at which earnings are maximized for the full sample increases to 62 years. An indeterminate outcome is observed for males, while the linear and quadratic coefficients exhibit the correct signs, the estimates are not statistically significant. Meanwhile, females maximize earnings at 45 years, a marked decline over the 1999 age-earnings turning point. In both 1999 and 2003, there is evidence of selection effects in all samples.[2] As in the case of Dominica and St. Lucia, the LFS provides limited instruments for modelling participation and the usual caveat is offered here on the interpretation of the selection effects.

The empirical results for job tenure are all statistically significant for the full samples in both years; however for males and females in the 1999 sample with one – five years of job tenure, a statistically insignificant estimate is obtained. In 1999, individuals with six to ten years of job tenure receive, on average and *ceteris paribus*, 9.2 percent more in monthly earnings than an individual in the base group with job tenure of less than one year. As job tenure increases, the growth in earnings over the base group increases correspondingly. For example, women with 16 – 20 years of job tenure earn, on average and *ceteris paribus*, 18.4 percent more than women in the base group. Males with the same years of job tenure earn, on average and *ceteris paribus*, 11.5 percent more than someone in the reference group. The premium for women with 20 or more years of job tenure is, on average and *ceteris paribus*, 26.4 percent more than an individual in the reference group. Although the Barbados labour market rewards job tenure, the differentials for higher levels of job market experience is lower on average than those observed in St.Lucia and Dominica.

In 2003, statistically significant effects are obtained for all job tenure estimates and the estimated effects for job tenure increases as compared to the former period. An individual in the labour force with one – five years of job tenure earns, on average and *ceteris paribus*, 12.7 percent more than an individual in the base group. As job tenure increases the wage premium is amplified; an individual with more than 20 years of tenure earns, on average and *ceteris paribus*, 44.8 percent more than an individual in the

base group. The earnings premium for tenure in 2003 in terms of magnitude is in line with those for the other countries analysed in the thesis. However, over time while the premium for St.Lucia contracts the premium in Barbados expands. For example, a female with 20 or more years of job experience receives earnings, on average and *ceteris paribus*, which are 50.4 percent more than someone in the private sector base group. The estimates on job tenure beyond 16 years for women in both years are larger than the estimates for males with corresponding job experience.

Table 7.2. Interval Regression Model Estimates for Basic Mincerian Log Monthly Earnings Specifications

Variables	1999			2003		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	4.2182***	4.1324***	4.0723***	3.1470***	3.5304***	2.5775***
	(0.1125)	(0.1728)	(0.1477)	(0.1568)	(0.2017)	(0.2381)
Age	0.0237***	0.0274***	0.0319***	0.0118***	0.0088	0.0259***
	(0.0040)	(0.0058)	(0.0056)	(0.0042)	(0.0055)	(0.0065)
Age^2	-0.0002***	-0.0003***	-0.0003***	-0.0001*	-0.0000	-0.0003***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)
Male	0.1246***	†	†	0.1656***	†	†
	(0.0116)			(0.0107)		
Secondary	0.1994***	0.1653***	0.2743***	0.1919***	0.1838***	0.2252***
	(0.0134)	(0.0177)	(0.0203)	(0.0133)	(0.0162)	(0.0230)
Technical vocational	0.2574***	0.1947***	0.4079***	0.3303***	0.3050***	0.4074***
	(0.0274)	(0.0339)	(0.0459)	(0.0233)	(0.0269)	(0.0459)
University	0.6376***	0.5467***	0.7771***	0.7879***	0.7169***	0.8816***
	(0.0176)	(0.0237)	(0.0266)	(0.0177)	(0.0235)	(0.0288)
Other	0.4341***	0.3143***	0.5692***	0.1217	0.1012	0.1510
	(0.0811)	(0.1210)	(0.1079)	(0.0828)	(0.0936)	(0.1556)
Tenure_2	0.0323*	0.0356	0.0261	0.1193***	0.1201***	0.1200***
	(0.0167)	(0.0253)	(0.0223)	(0.0169)	(0.0239)	(0.0239)
Tenure_3	0.0878***	0.0673**	0.1075***	0.1779***	0.1771***	0.1748***
	(0.0198)	(0.0294)	(0.0269)	(0.0189)	(0.0267)	(0.0268)
Tenure_4	0.1367***	0.1026***	0.1667***	0.2342***	0.2371***	0.2230***
	(0.0226)	(0.0324)	(0.0322)	(0.0216)	(0.0304)	(0.0307)
Tenure_5	0.1444***	0.1085***	0.1685***	0.2905***	0.2656***	0.3181***
	(0.0234)	(0.0334)	(0.0338)	(0.0245)	(0.0329)	(0.0376)
Tenure_6	0.2168***	0.1797***	0.2342***	0.3700***	0.3311***	0.4083***
	(0.0234)	(0.0337)	(0.0327)	(0.0221)	(0.0309)	(0.0318)
Log(Hours)	0.2257***	0.2732***	0.1869***	0.5627***	0.5184***	0.6237***
	(0.0177)	(0.0318)	(0.0208)	(0.0350)	(0.0461)	(0.0521)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.0523*	-0.0862*	0.0906**	-0.2287***	-0.2532***	-0.1106**
	(0.0302)	(0.0451)	(0.0422)	(0.0304)	(0.0400)	(0.0480)
Adjusted-R^2	0.2906	0.2630	0.3361	0.4591	0.5103	0.4070
McFadden R^2	0.0822	0.4955	0.5895	0.1397	0.5476	0.5947
Pseudo Log-Likelihood	-12955.8	-7121.9	-5794.4	-15483.1	-8142.9	-7295.1
Sigma (σ)	0.3824	0.3898	0.3700	0.3959	0.3767	0.4145
Sample Size	7478	3971	3507	8603	4454	4149

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

Rates of Returns to Education

The rates of return to education are derived for the secondary and tertiary level as the primary education level is the base group. This is unlike Dominica and St. Lucia where there is a sufficiently large base group of individuals with less than primary education. Expressions [5''] and [5'''] in chapter 4 are used to derive the estimates of the rates of return for secondary and university education respectively. The annualized rate of return to secondary education is about 4 percent in 1999 and 2003 for the pooled sample (see table 7.3). The formulation supported separation as verified by the Wald test and in 1999 the annualized return to secondary education for males yields roughly 3 percent

with a negligible increase in 2003. In both years the return to education for females at the secondary level is about five percent and is higher than the rates for males. In 2003 there is a slight decline in the rate of return to secondary education for women as compared to the earlier period. On the basis of a t-test the observed contraction is not statistically significant (see table 7.4).

The rate of return to university education is about 15 percent for the full sample in 1999, increasing to 20 percent in 2003, with the temporal differences yielding absolute t-ratios of 8.2. In 1999 the rate of return for university educated females is 17 percent and increases to 22 percent by the latter period. The t-statistics for the differences in the rates of return for females over the two time periods reveals the change is statistically significant ($|t| = 5.8$). As in the case for secondary education, the rates of return to university education for females are also higher than the returns for males, in both time periods. The earnings for women vis-à-vis the earnings of men with university education in 1999 are statistically significant with absolute value for the t-ratio for the difference of 4.3. In 1999, the additional premium accruing to males as a result of investment in university education is about 13 percent, growing to 18 percent in 2003. The t-ratios for the temporal differences in the rates of return for males in university education is statistically significant ($|t| =5.3$). In both years, the rates of return to university education are high for Barbadian females and this is feasible as within the female subgroup one-quarter of females are holders of university degrees as compared to the male subgroup where less than one-fifth are holders of university degrees. In 2003, the number of females in the Barbados labour market claiming university education increased by about 8 percentage points from 1999. The temporal change in estimated returns to a university degree suggests an increase in demand for high skilled labour.

The annualized rates of returns to education in Barbados are high in comparison to developed countries but remain lower than the returns for Dominica and St. Lucia; possible reasons for this outcome are explained in chapter 8 (comparative chapter). The annualized rates of return to educational qualifications for Barbados are presented in table 7.3.

Table 7.3. Annualized Rates of Return to Educational Qualifications

Qualifications	Rates					
	1999			2003		
	All	Male	Female	All	Male	Female
Secondary	0.0399***	0.0331***	0.0549***	0.0384***	0.0368***	0.0450***
	(0.0027)	(0.0035)	(0.0041)	(0.0027)	(0.0032)	(0.0046)
University	0.1461***	0.1271***	0.1676***	0.1986***	0.1777***	0.2188***
	(0.0047)	(0.0068)	(0.0065)	(0.0044)	(0.0068)	(0.0060)

Notes:
(a). The calculations are based on the basic Mincerian equation from table 7.2.
(b). See expression [5] in chapter 4 for the relevant formula.
(c). ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d). The duration of primary schooling is assumed seven years; secondary schooling is assumed five years; a university degree is assumed three years.
(e). The standard errors are reported in parenthesis.

In the empirical literature, Griffith (2001) using one round of survey data for 1999 obtains private returns for Barbados that are highest for the university level and ranges from 12.8 to 20.9 percent. Griffith also uses the Mincerian approach, but the exact rate of return value is dependent on the assumptions of the number of years of income foregone while enrolled in a particular educational level. In the thesis the years of foregone earnings for the university and secondary levels are three and five years respectively. According to the results framework of Griffith, based on the 1999 sample the comparable returns are 20.9 percent (14.6 percent in the thesis) for university education and 4.8 percent (3.9 percent in the thesis) for secondary education. Griffith (2001) uses one of the four rounds of the survey data in 1999, whilst in the thesis all four rounds in 1999 are used, hence giving a larger dataset of 7,478 observations as compared to 1,690 observations used in the Griffith (2001) study. Also, in terms of educational attainment Griffith (2001) excludes individuals with 'technical vocational' training or 'other' educational attainment whilst in the thesis these groups are retained. Overall, the returns for both the secondary and university education are in line with the results in the empirical literature for the Caribbean (see Griffith 2001 and Coppin 1996a; 1996b).

The estimates on the rates of returns for Barbados (see table 7.3) provide further evidence on the value placed on higher education in Eastern Caribbean labour markets. However, it also hints at scarcity in the supply of post-secondary individuals to the labour market. Further discussions on the similarities in the rates of return to education for the selected countries in the thesis are provided in Chapter eight.

Table 7.4. Barbados T-Statistics for Differences in Rate of Return to Education

Rate of Return	1999 All versus 2003 All	1999 Male versus 2003 Male	1999 Female versus 2003 Female	1999 Male versus 1999 Female	2003 Male versus 2003 Female
Secondary	-0.3944	-0.7688	1.5974	-4.0460***	-1.4710
University	-8.1777***	-5.2610***	-5.7913***	-4.2992***	-4.5323***

The basic Mincerian earnings function is augmented to include controls for industry, location and employment status (namely private sector, public sector and self-employment). The results are presented in table 7.5. The inclusion of additional variables to the Mincerian earnings function results in enhanced goodness-of-fit measures as indicated by increases in the adjusted R-squared values.

The selection effects have generally retained the same signs over the two time periods. The inclusion of additional controls has not affected the selection term significantly. There are large variations in the selection effects from the former to latter periods. The full samples and the male samples in both years take negative signs and are thus counter-intuitive. The presence of the negative sign has also been observed in the Dominica and St. Lucia results. In 2003 the sign changes to negative for females and becomes indistinguishable from zero. This therefore points to some peculiarities in the labour markets of Eastern Caribbean countries. However, it may also reflect on the quality of the instruments used here (i.e. head of household and other gender interactions). A bit of caution should be used in interpreting the selection effects as the availability of suitable instruments for selection into employment are limited. The unavailability of instruments to adequately assess labour market participation is unfortunately a consistent feature in the LFS surveys of the Eastern Caribbean.

The inclusion of the additional controls attenuates the magnitude of the estimates for education and job tenure effects as anticipated. The age at which earnings are maximized are now slightly lower in 1999, however, in 2003 although the indeterminate result is maintained for males, there is a temporal decline noted for females. The

reduction in the age maximisation level is due in part to the age effects are being captured by the additional controls, for example by industries.

Table 7.5. Interval Regression Model Estimates for Augmented Log Monthly Earnings Specifications

Variables	1999			2003		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	4.2499***	4.2044***	4.0884***	3.0699***	3.5412***	2.4944***
	(0.1116)	(0.1757)	(0.1423)	(0.1518)	(0.1994)	(0.2218)
Age	0.0216***	0.0236***	0.0299***	0.0154***	0.0103*	0.0296***
	(0.0039)	(0.0057)	(0.0054)	(0.0039)	(0.0053)	(0.0060)
Age^2	-0.0002***	-0.0002***	-0.0003***	-0.0001***	0.0001	0.0003***
	(0.0000)	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Male	0.1222***	†	†	0.1736***	†	†
	(0.0116)			(0.0106)		
Secondary	0.1750***	0.1462***	0.2314***	0.1896***	0.1807***	0.2106***
	(0.0132)	(0.0175)	(0.0197)	(0.0130)	(0.0163)	(0.0214)
Technical	0.2062***	0.1602***	0.3217***	0.3081***	0.2878***	0.3515***
vocational	(0.0268)	(0.0339)	(0.0424)	(0.0225)	(0.0265)	(0.0420)
Other	0.3601***	0.2942***	0.4192***	0.1338*	0.1084	0.1724
	(0.0691)	(0.1108)	(0.0866)	(0.0765)	(0.0886)	(0.1377)
University	0.5490***	0.4824***	0.6424***	0.7071***	0.6600***	0.7582***
	(0.0183)	(0.0249)	(0.0271)	(0.0178)	(0.0243)	(0.0277)
Tenure_2	0.0167	0.0213	0.0078	0.1143***	0.1162***	0.1129***
	(0.0163)	(0.0252)	(0.0212)	(0.0160)	(0.0233)	(0.0220)
Tenure_3	0.0650***	0.0517*	0.0737***	0.1631***	0.1698***	0.1568***
	(0.0195)	(0.0294)	(0.0259)	(0.0180)	(0.0261)	(0.0248)
Tenure_4	0.0995***	0.0793**	0.1096***	0.2130***	0.2232***	0.1988***
	(0.0224)	(0.0324)	(0.0317)	(0.0207)	(0.0299)	(0.0285)
Tenure_5	0.1107***	0.0905***	0.1174***	0.2559***	0.2496***	0.2619***
	(0.0227)	(0.0332)	(0.0317)	(0.0236)	(0.0322)	(0.0356)
Tenure_6	0.1685***	0.1526***	0.1628***	0.3209***	0.3077***	0.3352***
	(0.0231)	(0.0339)	(0.0309)	(0.0213)	(0.0306)	(0.0293)
Log(Hours)	0.2168***	0.2766***	0.1733***	0.5232***	0.4932***	0.5630***
	(0.0173)	(0.0324)	(0.0192)	(0.0337)	(0.0452)	(0.0475)
Government	0.0678***	0.0154	0.1207***	0.2192***	0.1081**	0.3829***
	(0.0242))	(0.0355)	(0.0303)	(0.0377)	(0.0505)	(0.0580)
Self-employed	0.1236***	0.1161***	0.1318***	0.0594***	0.0174	0.1300***
	(0.0165)	(0.0210)	(0.0270)	(0.0157)	(0.0182)	(0.0308)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection	-0.0415	-0.0958**	0.0988**	-0.1700***	-0.2211***	-0.0492
	(0.0295)	(0.0452)	(0.0405)	(0.0290)	(0.0393)	(0.0442)
Term)						
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes
Stratum Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.3403	0.2940	0.4128	0.5120	0.5390	0.4977
McFadden R^2	0.0999	0.5010	0.6037	0.1625	0.5546	0.6119
Pseudo Log-Likelihood	-12705.9	-7043.3	-5594.6	-15073.6	-8017.2	-6984.2
Sigma (σ)	0.3688	0.3815	0.3480	0.3760	0.3655	0.3815
Sample Size	7478	3971	3507	8603	4454	4149

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) † denotes not applicable in estimation

Inter-industry Wage Structure

The industry effects are investigated through the use of expression [8] in chapter 4 and the results are presented in table 7.6. In 1999, attachment to the 'agriculture', 'manufacturing', 'hotels', 'general services' and 'retail' industries results in earnings premia that are significantly below the employment weighted average. The agriculture sector records earnings 13 percent below the employment weighted average. Meanwhile, 'transport', and 'finance' industries reports premia relative to the employment weighted average in excess of 20 percent. Across gender groups the results are generally in line with the average for the full sample, however, the average premia received by females in both 'transport' and 'finance' industries are substantial at 43.1 percent and 23.3 percent above the employment weighted average, respectively. In the transport industry females are in the minority comprising about 2.2 percent as compared to 5.2 percent of males. However, in the finance industry females are in the majority accounting for about 7.9 percent of the employees as compared to 4.0 percent of males.

The finance industry has clearly benefitted from expansions in international business services and also in the number of service providers. Barbados has secured a niche in the licensing of foreign sales corporations; in 2000/01 there were 2,857 foreign sales corporations licensed to operate in Barbados, with only 75 such entities licensed elsewhere in the region (see Suss et al. 2005). In 2001, the Organisation for Economic Cooperation and Development (OECD) listed Barbados as a tax haven and immediately the number of licensed entities declined. Barbados was removed from the OECD blacklist in the early part of 2002 following the amendment of existing legislation and the enactment of new legislation on governance and anti-money laundering (see IMF 2004). If the average premia in 'finance' industry is used as an indicator, it seems the industry has recovered well from the 2001 episode.[3]

In 2003, the premia is below the employment weighted average in 'agriculture', 'manufacturing', 'retail' and 'general services' industries, with women being the most disadvantaged in these industries. The 'transport' and 'finance' industries maintain premia above the employment weighted average with further widening in the premia

within the 'finance' industry. The premia in 'transport' remains relatively stable, although there is a slight decline in the recorded premia above the employment weighted average for women in 2003 as compared to the former period.

In 2003, employees in the 'construction' industry receive an earnings premia of about six percent. This may be linked to increased public sector investment in infrastructure to boost economic growth following recessionary pressures in 2000-01. In 2003, the public sector was engaged in major construction activity on the international airport and extensive road works. The rewards for women in construction are statistically significant at 34 percent above the employment weighted mean. The representation of women in 'construction' industry is however low at about one percent, but given the sizeable earnings premium, the few women in 'construction' are likely to be found in the technical and professional tracks meriting the earnings premia.

The premia in 'hotels' industry improved, with employees earning a premia 2.7 percent above the employment weighted average. Women in 'hotels' are at an advantage with an earnings premia 9.8 percent above the female employment weighted average. The growth in the earnings of women above the employment weighted average is on account of expansion in the luxury hotel category, with the commissioning of a number of exclusive resorts and villas requiring disproportionately more female than male employees. In the 2000s, the Barbados tourism sector benefited from a change in the legislative framework for tourism investment and development. The enactment of the Tourism Development Act of 2002 resulted in the construction of eleven new hotels and the extension and renovation of an additional ten hotels (see Government of Barbados 2004). The Tourism Development Act also benefited the restaurant sub-sector. The boost in tourism capital projects in part explains the increase in premia within both the construction and hotel sectors.

The rents accruing to employees in 'public administration' in 1999 are above the industry weighted average in 1999. In 2003, the earnings premia for females employed in 'public administration' were 12 percent below the employment weighted average, while only four years prior in 1999, females employed in the sector received returns that were 5.8 percent above the employment weighted average.

Table 7.6. Inter-industry Earnings Deviations

One-Digit Industry Sector	1999 Deviation from Average			2003 Deviation from Average		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Agriculture	-0.1239***	-0.1336***	-0.1203***	-0.1890***	-0.1755***	-0.2068***
	(0.0231)	(0.0312)	(0.0315)	(0.0204)	(0.0257)	(0.0332)
Manufacturing	-0.0561***	-0.0117	-0.0971***	-0.0595***	-0.0048	-0.1088***
	(0.0164)	(0.0228)	(0.0235)	(0.0202)	(0.0273)	(0.0300)
Utility	-0.0132	-0.0097	-0.0209	-0.0258	-0.0041	-0.0388
	(0.0346)	(0.0413)	(0.0617)	(0.0349)	(0.0506)	(0.0481)
Construction	-0.0180	-0.0349***	0.0530	0.0600***	0.0262*	0.2945***
	(0.0136)	(0.0138)	(0.0514)	(0.0146)	(0.0152)	(.0701)
Retail	-0.0426***	-0.0314	-0.0464***	-0.0298**	-0.0187	-0.0206
	(0.0127)	(0.0206)	(0.0157)	(0.0138)	(0.0200)	(0.0200)
Hotels	-0.0434***	-0.0333	-0.0439***	0.0265*	-0.0273	0.0932***
	(0.0143)	(0.0234)	(0.0177)	(0.0145)	(0.0203)	(0.0211)
Transport	0.2056***	0.1428***	0.3585***	0.1903***	0.1447***	0.2898***
	(0.0263)	(0.0300)	(0.0504)	(0.0246)	(0.0283)	(0.0478)
Finance	0.1949***	0.1650***	0.2097***	0.3405***	0.2760***	0.4064***
	(0.0188)	(0.0309)	(0.0241)	(0.0197)	(0.0336)	(0.0255)
General Services	-0.0556***	-0.0432***	-0.0563***	-0.0679***	-0.0557***	-0.0566***
	(0.0106)	(0.0160)	(0.0141)	(0.0133)	(0.0175)	(0.0204)
Public Administration	0.0662***	0.0746***	0.0561**	-0.0456	-0.0044	-0.1276***
	(0.0193)	(0.0293)	(0.0251)	(0.0293)	(0.0402)	(0.0441)
Overall Variability (Krueger & Summers)	0.0819	0.0698	0.0982	0.1147	0.0832	0.1631
Overall Variability (Haisken-DeNew & Schmidt)	0.0802	0.0658	0.0954	0.1129	0.0787	0.1600

Notes:
(a) The calculations are based on the augmented equations from table 7.5.
(b) See expression [8] for the relevant formula.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) See text for the computation of the overall variability measures.
(e) The inter-industry wage structures for men and women were computed from the gender-specific log earnings equations.
(f) The Duncan & Duncan index of industrial dissimilarity is 0.2085 in 1999 and 0.2093 in 2003. This is computed as half the sum of the absolute gender differences in the one-digit industry proportions.

The evidence from the Duncan and Duncan (1955) dissimilarity index (see notes to table 7.6) identifies the presence of gender segregation at the one-digit industry level in both 1999 and 2003 with negligible change over time. Notwithstanding the existence of gender segregation in industry, the index in Barbados is lower as compared to the indices for Dominica and St.Lucia in the thesis.

The estimates for the overall variability in inter-industry wage dispersion are low as compared with those found for the other Eastern Caribbean countries in the thesis. For example, in 1999 both the Krueger and Summers and Haisken-DeNew and Schmidt estimates for overall variability for the pooled sample are about 0.08. The overall variability in the inter-industry wage dispersion is lower for males (about 0.07) than females (0.10). By 2003 the overall variability in inter-industry wage dispersion widens to about 0.11 irrespective of the measure used. Again the inter-industry wage

dispersion is lower for males than females and this hints at some degree of industrial segmentation, especially as women concentrate in industries with lower pay, it is only expected that the differences in wages for women would record greater overall variation. The wage dispersion for females in 2003 as compared to 1999 almost doubles.

In summary, there is greater overall variability in the industry wage structure among women than men in the Barbados labour market. This finding is the opposite of Dominica and St.Lucia where the overall variability is larger for males than females. In Barbados, given the higher education outcomes for women and their attachment to industries with earnings above the employment weighted averages (construction, finance, hotels and transport), the greater overall variability are understandable. In Barbados, for example, in 2003 about 35 percent of women in the labour force are attached to industries with earnings above the employment weighted average. In Dominica in 1999 an estimated 8 percent of females are in industries with earnings above the employment weighted mean and in St.Lucia in 2004, the corresponding average is 10 percent. In all the countries in the thesis, earnings for women in the 'finance' industry are above the employment weighted average. In two of the countries (Barbados and Dominica) the same is true for women in the 'construction' industry.

The estimates for the overall variability in inter-industry wage dispersion in Barbados in 1999 is similar to those found in Europe, for example in The Netherlands (0.07), Belgium (0.07) and Norway (0.09) (see Gannon and Nolan 2004). These are countries with strong public sectors and trade unions.

The coefficients on the deviations from the employment weighted average for industries in table 7.6 are used to derive the Spearman Rank order correlation coefficient in industry ranking between 1999 and 2003. The coefficient on the Spearman rank order correlation is 0.79 for the full sample ($|t| = 0.0061$); 0.81 for the male sample ($|t| = 0.0049$); and 0.66 for the female sample ($|t| = 0.0376$). On a temporal basis the rankings of the wage structure of the 10 industries remains steady indicating steadfastness in the industry wage structure in Barbados.

The t-statistics for the temporal differences in the inter-industry wage differentials finds earnings in 'agriculture' and 'public administration' in 1999 are statistically significantly above earnings in these sectors in 2003. This is conceivable as in the beginning of the 2000s the European Union commenced discussions on a compensation scheme with sugar producing countries under the Accompanying Measures for Sugar Protocol Countries for the eventual phasing out of sugar into EU market under preferential access. The early 2000s heralded the advance stage of the decline of the Barbados sugar industry.

The temporal differences in the inter-industry wage differentials in 'construction', 'hotels' and 'finance' industries in 2003 are statistically significant above earnings in 1999 with absolute t-ratios of 3.91, 3.44 and 5.35 respectively. The higher earnings in the construction sector in 2003 are possibly attributed to an expansion in infrastructure projects under the public sector investment programme. By 2003, the financial sector had rebounded from the effects of inclusion on the OECD's blacklist. Overall the financial sector in Barbados employs upwards of 3000 persons, while providing indirect employment in tourism and a host of financial and non-financial services. The sector is an important one for Barbados with the total corporate tax revenue from financial services entities accounting for about three-fifths of total corporate tax revenue (see EU 2002).

The findings on the t-ratios for females mirror those for the pooled sample. However, for the male sample t-statistics in 'agriculture' and 'hotels' and 'public administration' are statistically indistinguishable from zero, thus pointing to no movement in the earnings for males within these industries between the two time periods. In fact for males, it is only in the 'construction' and 'finance' industry that earnings in 2003 are statistically significantly above the earlier time period relative to the employment weighted average with absolute t-ratios of 2.98 and 2.43 respectively. The t-statistics for differences in the inter-industry wage differentials are presented in table 7.7 below.

Table 7.7. Barbados T-Statistics for Differences in Inter-Industry Wage Differentials

Industry	1999 versus 2003		
	All	Male	Female
Agriculture	2.1109**	1.0363	1.8887*
Manufacturing	0.1315	-0.1944	0.3071
Utility	0.2577	-0.0868	0.2289
Construction	-3.9099***	-2.9827***	-2.7781***
Retail	-0.6853	-0.4427	-1.0158
Hotels	-3.4421***	-0.1931	-4.9777***
Transport	0.4233	-0.0451	0.9897
Finance	-5.3464***	-2.4275**	-5.6047***
General Services	0.7273	0.5307	0.0101
Public Administration	3.1821***	1.5885	3.6157***

Note:
(a) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Public Sector Wage Premium and Gender Pay Gap

The inclusion of controls for employment status, namely affiliation to the government sector, private sector or self-employment allows for direct analysis of the public sector wage premium and the gender pay gap. The results for the augmented Mincerian earnings function presented in table 7.5 allows for the examination of these results. In 1999, an individual in a public sector job earned on average and *ceteris paribus* 7.0 percent more than an individual in private sector employment. For males the results were statistically indistinguishable from zero, suggesting no difference in earnings between public and private sector workers. However, females received a public sector pay premium, on average and *ceteris paribus*, of 12.8 percent more than an individual in the private sector base group. By 2003, the level of the rewards to employment in the public sector increased substantially for the pooled, male and females samples.

In 2003, the public sector pay premium for an individual in the full sample is on average and *ceteris paribus* 24.5 percent more than the earnings of someone in the private sector. In 2003, the pay premium received by women in the public sector is more than triple the pay premium in the earlier period. Female public sector employees received earnings on average and *ceteris paribus* 46.7 percent higher than the earnings of females in the private sector. In 2001, despite the global economic downturn, public sector

wages increased by 2 ¾ percent, while the basic income tax rate declined thus increasing the net earnings of public sector employees post-2001.[4] The public sector coefficients reported in table 7.5 are again reported in table 7.8 for ease of reference.

Table 7.8. Barbados Public Sector Pay Premium and Gender Pay Gap

	1999			2003		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Public Sector Pay Premium						
Raw (or unadjusted) Public sector pay premium	0.2542*** (0.0126)	0.1885*** (0.0177)	0.3224*** (0.0175)	0.3535*** (0.0138)	0.2582*** (0.0184)	0.4496*** (0.0200)
Ceteris paribus (or adjusted) public sector pay premium 1/	0.0678*** (0.0242)	0.0154 (0.0355)	0.1207*** (0.0330)	0.2192*** (0.0377)	0.1081** (0.0505)	0.3829*** (0.0580)
Gender Pay Gap						
Raw (or unadjusted) gender pay gap	0.1301*** (0.0107)	†	†	0.1804*** (0.0117)	†	†
Ceteris Paribus (or adjusted) gender pay gap 2/	0.1246*** (0.0116)	†	†	0.1656*** (0.0107)	†	†
Ceteris Paribus (or adjusted) gender pay gap 3/	0.1222*** (0.0116)	†	†	0.1736*** (0.0106)	†	†

Notes:
(a) 1/ reports the *ceteris paribus* public sector pay premium from the augmented specification.
(b) 2/ reports the *ceteris paribus* gender pay gap from the basic Mincerian specification.
(c) 3/ reports the *ceteris paribus* gender pay gap from the augmented specification.
(d) The public sector pay premium and the gender pay gap as reported in the table are the coefficients reported in log-points.
(e) † Implies not applicable to current specification.

The computation of t-ratios for the temporal differences in the public sector premium finds statistically significant results for the pooled and female samples. The t-ratios for the pooled and female sample are ($|t| = 3.4$) and ($|t| = 3.9$) respectively. Thus, the public sector premium in 2003 is statistically greater than in the earlier period (see table 7.9).

The raw (or unadjusted) public sector pay premium is statistically significant for all years and gender groups and increases over time. However, the rents accruing to females as in the *ceteris paribus* cases are higher as compared to the rents for males.

Table 7.9. Barbados T-statistics for Differences in Public Sector Pay Premium and Gender Pay Gap

	1999 vs. 2003		
	All	**Male**	**Female**
Public Sector Pay Premium	-3.3798***	-1.5028	-3.9282***
Gender Pay Gap 1/	-2.6031***	†	†
Gender Pay Gap 2/	-3.2664***	†	†

Notes:
(a) T-statistics for the differences in the public sector premium are derived from the *ceteris paribus* public sector pay premiums in the augmented specification.
(b) 1/ T-statistics for the differences in the gender pay gap are derived from the *ceteris paribus* gender pay gaps in the basic Mincerian specification.
(c) 2/ T-statistics for the differences in the gender pay gap are derived from the *ceteris paribus* gender pay gaps in the augmented specification.
(d) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

In the Barbados, almost two-thirds of the employed are attached to the private sector in both time periods; whilst under a quarter of the employed workforce is in the public sector. The wages in the private sector on average tends to be low; however wages for managerial positions in the private sector wages tend to be higher than the wages for comparable managerial positions in the public sector. Further, as derived from the summary statistics in chapter three the majority of post-secondary educated individuals are employed in the public sector; and in order to attract these individuals the wages in the public sector needs to be competitive. Although some may argue that the remuneration for tertiary educated individuals may be better in the private sector, the public sector provides a host of non-pecuniary benefits which makes tenure more attractive. Public sector employees in Barbados have security of tenure, receive benefits such as paid study leave, insurance, pension plan and are represented by a strong civil service union.

The results for the augmented specification as presented in table 7.5 also allows for the investigation of the gender pay gap. The constant only regression model gives a raw (or unadjusted) gender pay of 13.9 percent for 1999, increasing to 19.8 percent in 2003. The inclusion of additional controls to derive estimates for the basic Mincerian model gives an adjusted gender pay gap in 1999 of 13.3 percent on average and *ceteris paribus*. By 2003, the pay advantage to males increases to 18.0 percent on average and *ceteris paribus.* The use of t-ratios to determine the temporal differences in the gender pay gap derived from the basic Mincerian estimates indicates statistically significant absolute value of 2.6, pointing to significantly higher gender pay gap in the latter period. The results for the gender pay gap suggests that most of the pay gap if not all are a treatment effect and not due to endowment differences. Barbados has only as

recently as February 2010, announced in the media the move to develop a gender policy.

Conclusions and Summary of Findings

The rates of return to education for university education in Barbados are in line with the returns in the empirical literature for the Caribbean (see Griffith 2001). The labour force survey data for Barbados contains few observations for individuals with less than primary education and this is linked to the advanced state of educational access in this country. The lack of individuals with less than primary education has resulted in primary education forming the reference group in the regression model and limits the opportunity to derive rates of return estimates for that level. The lack of estimates for the primary level limits comparison with the existing literature on primary level returns (see Psacharopoulos et al. 2004) and also with the results for the other countries in the thesis. However, given the evidence on the rates of return for Dominica and St. Lucia in the study it is safe to assume that the returns to education in Barbados follow the 'Caribbean pattern' rather than the more conventional international pattern argued in the literature. The rates of return to education in the Caribbean are lowest at the primary level and increases progressively with educational attainment, culminating with the highest rates of return at the university level.

Women in the Barbados labour market are confronted with unequal labour market earnings. The existence of the gender pay gap is likely due more to treatment effects than endowment differences, as females in Barbados are the larger holders of higher educational qualifications. The existence of a gender pay gap is a common occurrence in Caribbean labour markets as observed from the empirical results. Generally, over time the gender pay gap narrows as suggested by the evidence from Dominica and St.Lucia. However, in Barbados, the male pay advantage has widened over time with the raw (or unadjusted) moving from 13.9 percent in 1999 to 19.8 percent in 2003. Hence, women although being more educated than men in the labour market are not correspondingly rewarded, with the pay disadvantage worsening over time. The size of the gender pay gap estimates for Barbados are in comport with those obtained in the

empirical literature for the Caribbean (see Hotchkiss and Moore, 1996; and Olsen and Coppin, 2001).

The reduction in preferential access of Barbadian agricultural products, mainly sugar into the EU market, has affected the earnings premia in the 'agriculture' and 'manufacturing industries. Employees in the 'general services' industry are also consistently in receipt of earnings premia below the employment weighted average. The expansion in economic activity in the 'construction' and 'hotels' industries act to positively impact on the earnings premia in these industries. In 2003, the premia in both industries is above the employment weighted average and is especially high for women. The development of the enabling environment for the offshore and international business sector has augured well for employees in the 'finance' industry. The 'transport' and 'finance' industries in Barbados have generous premia above the employment weighted average and these are maintained consistently during both the former and latter periods, with strong rewards for women in these industries.

The public sector in Barbados clearly pays rent to its employees, with remuneration in the sector becoming more lucrative over time. Employees in the public sector earned on average and *ceteris paribus* 7.0 percent more than those in private sector employment. By 2003, government employees earned on average and *ceteris paribus* 24.5 percent more than those in the private sector. The presence of rents accruing to public sector employees is in broad agreement with the existing findings in the empirical literature (see Anós-Casero et al. 2006 for Djibouti; and Terrell 1992 for Haiti). Earnings in the public sector act as the *de facto* wage setting benchmark for other segments of the labour market. The existence of above average earnings premia in the public sector may thwart the effective working of the labour market pay setting mechanisms in other sectors, if earnings in the public sector are used as a signal for average labour market wages, especially in the absence of functioning minimum wage mechanism, for example.

The findings on the estimates for the rates of returns to education, inter-industry wage structure, public-private sector pay premium and the gender pay gap for Barbados have proven to be enlightening. The analyses on the selected themes for Barbados has shown that the effects of the government of Barbados educational policy has led to returns to

education that are slightly lower than those obtained in St.Lucia and Dominica, but nevertheless high in comparison to developed countries. In the Barbados labour market, as compared to the other countries in the study, there is less scarcity in the supply of post-primary skilled employees to the labour market. The Barbados labour market, as is the case in the other two countries, discriminates against women in the labour market, with the gap in the pay advantage to men widening, even in the presence of greater human capital accumulation by women. Overall, the findings for Barbados identify certain areas of heterogeneity in Caribbean labour markets and strong gender dimension to the estimates. Further details on the comparative analyses for the selected countries on the themes of interest in the study are detailed in chapter 8.

ENDNOTES

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[1] The Wald test results are reported in table A.7.2.
[2] The selection correction term (or inverse mills ratio) is constructed from the probit estimates in table A7.3.
[3] The finance industry accounts for about 40 percent of government revenue (see IMF 2004).
[4] On 1 January 2003 the basic rate of income tax on the first 24,200 Barbados dollars was reduced by 2 ½ percentage points to 22.5 percent (see IMF 2004).

CHAPTER 8: COMPARATIVE ANALYSIS

Introduction

The preceding chapters have examined individually for each country a series of selected labour market themes. In this chapter the outcomes for the different themes are compared across countries to determine similarities and differences. The rationale for this chapter is to examine the empirical findings that are characteristic of Eastern Caribbean labour markets and those which are peculiar to the individual countries.

Dominica and St. Lucia share many similarities including: membership in regional institutions (the Organisation of Eastern Caribbean States and the Eastern Caribbean Central Bank); colonial history interspersed with French and British rule; large Afro-Caribbean populations; small population size; common currency; contractions in banana industry; high unemployment; susceptibility to natural disasters; and open economies vulnerable to external shocks. Barbados due to its eastern location in the Caribbean archipelago has been affected by five weather related storms over the period 1979 to 2009, with minimum financial losses, compared to 20 storm events in Dominica and St. Lucia with extensive damage to the agriculture industry and coastal infrastructure.[1] Their fairly similar features and experiences permit a comparison of outcomes across the two countries. Barbados given its high GDP per capita and more advanced level of development has a slightly different economic orientation to Dominica and St. Lucia. However, similarities still abound. Barbados was subject to colonial rule but with sole occupation by the British, the population is largely of African descent, but a small native white population, the descendants of the planter class and others of white origin, remains on the island. In Dominica an indigenous population of Caribs accounts for about five percent of the population, but in St.Lucia the population is largely of African descent.

The colonial past of the English speaking Caribbean countries is linked to Great Britain and the countries have retained many of the former colonial powers political, educational, and economic structures and customs. Commencing in the mid-1960s

Caribbean countries gained political independence from the British, but for continuity the countries retained many features of the original British educational system. The educational system in much of the English-speaking Caribbean consists of seven years of primary schooling, followed by five of secondary education. Thereafter, students may opt to progress to the tertiary or university level thus being engaged in formal education for an additional two- or three-year period respectively.

Of the three countries Dominica is the largest in terms of land area, but the smallest in population size. Barbados has the largest population, but smallest land size resulting in a high population density. Both Barbados and St. Lucia are upmarket tourism destinations, with strong market shares in long haul stay-over arrivals from the European and North American markets. Dominica, in contrast, has not been as effective as St. Lucia and Barbados at developing their tourist industry to attract the high volumes of stay-over tourist arrivals as the island lacks direct air access from international markets. In addition, the mountainous terrain, rugged topography, lack of international hotel chains, and the black sand beaches conflict with the more attractive 'sun, sand and sea' concept generally associated with Caribbean tourism. The declining importance of the agricultural sector has forced the shift in focus to the services sector as a means of economic diversification. However, the transition has been slowest in Dominica. In respect of the offshore financial services sector Dominica enjoyed some short-lived success in that sector, though increased international scrutiny by the Organisation for Economic Cooperation and Development (OECD) led to the blacklisting of the island pending corrective measures. Dominica was successful in leaving the OECD blacklist, but thereafter the development of the financial sector was not pursued with much intensity. Barbados has been successful in diversifying also into financial services and the international business sector with corporate tax revenue from these sectors accounting for an estimated three-fifths of total corporate tax revenue (see EU 2002).

The countries, given their small size and openness, have all been exposed to the effects of external economic shocks. Over the recent past, all three Eastern Caribbean countries have been affected by global economic slowdowns resulting in declines in economic activity. Barbados and Dominica over the last decade implemented structural economic reform programmes to correct balance of payments and fiscal imbalances resulting from the global economic slowdowns (see IMF 2004; IMF 2007). In both

countries the IMF recommended a wage freeze for public sector workers, unfortunately the LFS data used in this analysis precedes the introduction of the reform programmes and any changes in labour market outcomes around the themes of interest in the study cannot be assessed and therefore should be taken to provide a potential area for future research on this topic.

Table 8.1. Selected Labour Market, Social, and Macroeconomic Indicators

	Barbados	Dominica	St. Lucia
Labour Market			
Labour Force Participation Rate 1/			
Male	75.0	75.5	75.2
Female	62.2	54.5	62.3
Total	68.2	65.2	68.7
Unemployment Rate 2/			
Male	6.9	13.1	17.5
Female	9.0	19.4	25.0
Total	7.9	15.7	21.0
Unemployment Rate Youth aged 15 – 24 years 3/			
Male	38.0	50.4	46.1
Female	41.6	31.0	35.2
Total	40.0	40.6	40.0
Social and Demographic			
Human Development Index (HDI), 2009 rank) 4/	37	73	69
Population (in millions)	0.285	0.072	0.167
Life Expectancy at birth (in years)	75.4	77.0	73.6
Adult literacy rate (% ages 15 years and above)	99.4	88.0	94.8
Macroeconomic			
Agriculture value added (percent of GDP)	3.5	19.8	5.1
Manufacturing value added (percent of GDP)	6.8	8.8	5.4
Services value added (percent of GDP)	80.1	55.0	76.9
GDP per capita, current prices (US$ 2008)	13,314	5,082	5,806

Sources: Labour Market Indicators- International Labour Organisation based on national household surveys; IMF World Economic Outlook; United Nations Development Programme; and World Bank World Development Indicators.

Notes:

(a) 1/ Data are from Labour Force Surveys for years as follows: Barbados (2007); Dominica (1999); St. Lucia (2003).

(b) 2/ Data are from Labour Force Surveys for years as follows: Barbados (2007); Dominica (1999); St. Lucia (2004).

(c) 3/ Data are from Labour Force Surveys for the years as follows: Barbados (2003); Dominica (1999); St. Lucia (2004).

(d) 4/ A low rank indicates a strong position

The foregoing overview identifies some similarities in the economies of the selected countries. However, there are a few marked differences in the economic structure of the countries. In Dominica, the agriculture sector accounts for 19 percent of GDP, industry 24 percent and services 57 percent on average in 2004. In St. Lucia, agriculture comprises five percent of GDP, industry 18 percent and services 77 percent in the same year. In Barbados the contribution of agriculture is modest at four percent of GDP, industry 16 percent and services 80 percent in 2004. Table 8.1 outlines some key

economic, social and labour market indicators for the selected Eastern Caribbean countries.

The overall labour force participation rates in the selected countries are similar, with lower labour force participation for women. Labour force participation is lowest in Dominica and correspondingly the female labour force participation is also the lowest in the three countries at 55 percent. Given the demise of the agricultural sector in Dominica – a source of casual employment for women – the majority of jobs are now concentrated in the capital city of Roseau. The topography of the island makes travel lengthy and also costly thereby significantly reducing the attractiveness of urban jobs for rural dwellers especially if the employment options are at the lower-end of the pay distribution. Unemployment in 2004 was lowest in Barbados and highest in St.Lucia, with the incidence of unemployment greater for females in all three countries. The prevalence of unemployment among youths aged 15 to 24 years is high in all the selected countries with the incidence greater among males in Dominica and St.Lucia. Table A.8.1 provides an overview of unemployment rates for selected Caribbean countries.

The social indicators, namely life expectancy at birth, adult literacy and primary and secondary school enrolment in the Eastern Caribbean are good in comparison to many developing countries. On a comparative basis, Barbados fares better than both St. Lucia and Dominica, as poverty and unemployment are lower and educational outcomes better. In Barbados, a larger proportion of the population are in possession of post primary educational attainment as their highest educational level (see figure 8.1) and Gross Domestic Product (GDP) per capita is on par with that of developed countries at US$13,314 as compared to US$5,082 and US$5,806 in Dominica and St.Lucia, respectively.

Figure 8.1 Educational Attainment of Labour Force in 2000

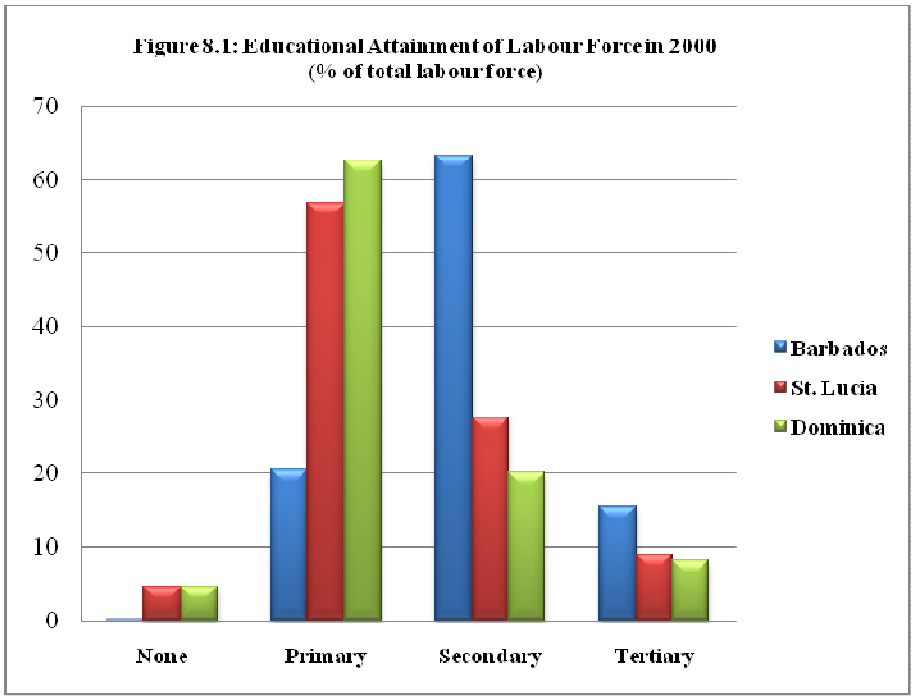

Figure 8.1 Educational Attainment of labour Force in 2000

Source: ILO and Dominica Central Statistics Office

Overall the economy of Barbados has progressed at a much faster rate than that of Dominica and St. Lucia and this is reflected in its high ranking in the United Nations Development Programme (UNDP) Human Development Index (HDI). The economic and educational outcomes for Barbados, as compared to the other two countries, have been facilitated by both its colonial past and acts of nature. Firstly, Barbados has had uninterrupted British rule and given the country's tropical climate many of the owners were resident rather than absentee. The first attempts at formal schooling were initiated in Barbados as far back as 1686 (see Government of Barbados 2000). Second, the easterly location of Barbados in the Caribbean archipelago renders it more immune from the direct onslaught of tropical weather-related disasters, thus eliminating the additional costs associated with to reconstruction after these natural disasters.

The analyses on the rates of returns to education, inter-industry wage structure, public-private sector pay premium and gender pay gap are all undertaken using the Mincerian earnings function as the methodological framework. In addition, as noted in chapter three, the national labour force surveys are the data source for the analysis in each of the three countries. Given the same methodological framework and the broadly comparable data sources used for the analysis in this research, comparison across the three islands is rendered more straight-forward. Moreover, the countries share labour market, economic and social similarities and this further improves the ability to analyse the empirical findings in the context of the Caribbean but also permits the analysis to be situated within the findings of the broader international empirical literature. The variety of themes studied and the comparability of countries makes this an original piece of research in so far as this type of comparative analysis has not been undertaken for any countries in the Caribbean region to date. In the empirical literature on the Caribbean, studies have been undertaken both jointly and individually on the themes of rates of return and gender pay gaps, and individually on public-private sector pay gaps, but never on the nature and structure of the inter-industry wage structure.

The chapter is organised as follows. The next section provides a comparative summary of the data for Dominica, St. Lucia and Barbados, identifying similarities and any differences in the datasets. Section three draws together the empirical results for the three countries and section four concludes.

Data Summary: A Review

In Dominica and St. Lucia slightly more than one-half of respondents are educated to primary level in the 1990s. In Barbados there is a large difference in the proportion of respondents claiming primary educational attainment as their highest qualification, with only one-fifth of respondents educated to at most primary level. The proportion of males educated to primary level in all the countries in the study is higher compared to females. The group educated to secondary level is about one-quarter of the employed sample in Dominica and St.Lucia. In Barbados more than 60 percent of respondents are educated to secondary level and this is more than twice the percentage for that cohort in

Dominica and St.Lucia. In Dominica and St. Lucia more females than males have secondary education. In Barbados the gender composition at the secondary level is more equal. An estimated 15 percent of the employed in Dominica (1999) and St.Lucia (2004) hold post-secondary qualifications, and again the share of females at that level exceeds the male share. Another point of divergence in the structure of educational attainment in Barbados as compared to the other countries is the proportion of university educated. In Barbados, an estimated one-fifth of the employed sample in 2004 has university qualifications, compared to fewer than five percent in Dominica and St.Lucia. The difference in university attainment rates is likely attributable to the presence of the Cave Hill campus of the University of the West Indies, as well as the explicit educational policy of the Government of Barbados which provides university tuition assistance for suitably qualified students.

In the empirical literature, Barbados rates as the region's star performer in educational provision and outcomes (see World Bank 2005b). The average years of schooling in Barbados were 8.7 in 2000 an estimated 2.2 years above the global average and higher again than the averages for Latin America and the Caribbean. A point of general similarity in the Eastern Caribbean educational system is that females are generally better educated than males.

In all three countries, about one-half of the employed have held their jobs for five years or more. In terms of current employment status, the private sector employment rate is larger in St.Lucia and Barbados than in Dominica. In St.Lucia and Barbados more than 50 percent of the employed are attached to the private sector compared to about 42 percent in Dominica. The self-employment sector is large in Dominica (37 percent of those employed) compared to St. Lucia and Barbados where less than one-fifth of respondents in the earliest time period are in self-employment activity. About one-fifth of respondents in the three countries are in public sector employment. A greater proportion of females than males are in employment in the public and private sectors in all the countries. In all three cases, males are the dominant gender group in the self-employment category.

In general, individuals with higher educational attainment tend to select into the public sector. For example, in Dominica one-third of individuals with post-secondary

education are in public sector employment. About 85 percent of the self-employed group have educational attainment below the secondary level. An estimated 3.6 percent of the self-employed have been educated beyond the post-secondary level. The educational attainment and employment rate in the public sector in Dominica mirrors the existing empirical evidence in the literature (see Anós-Casero and Seshan 2006 for Djibouti; Terrell 1992 for Haiti; and Coppin 2007 for Trinidad and Tobago). Similarly, in St.Lucia and Barbados, individuals with post-secondary education are also more likely to be found in public sector jobs. The nature of the public sector in the Caribbean guarantees job-security and includes attractive non-wage benefits such as paid study leave with the possibilities of tuition assistance, and generous vacation leave ranging from 21 to 36 days per year (see World Bank 2005a).

The industry structure also varies across countries. In St.Lucia and Dominica the agricultural sector is the largest employment sector in 1996 and 1999 respectively, and employs more males than females. In St. Lucia in 2004, employment in the agricultural sector declined in line with the reduction in EU preferential market access. In Barbados fewer than five percent of respondents in both years are employed in the agricultural sector. Between eight to 14 percent of respondents over the survey periods are engaged in the manufacturing sector. However, over time the sector's contribution to employment has declined in Barbados and St.Lucia to 6.3 percent and 7.8 percent respectively for the latter time periods.

In Barbados and St. Lucia, the hotels' sector, a proxy for employment in the tourism industry, employs about ten to thirteen percent of respondents. In Dominica fewer than five percent of respondents are employed in the hotels sector, pointing to the slower pace of development of tourism in Dominica in relation to the other two countries. In all instances the level of employment in the utility sector is small accounting for less than two percent of respondents. In the countries that feature in the study, the relative percentages of respondents employed in the construction and retail sectors are broadly comparable. The composition of the industry classification in St. Lucia and Dominica permitted the delineation of the public administration sector with job categories in the education and health sectors being assigned to social services. In Barbados the distinction between public administration and social services is not made and so social services are subsumed within the public administration category. The industry

attachment to public administration is similar across all three countries. Once the sub-sample employed in social services in Dominica and St. Lucia are conflated, about one-fifth of respondents are employed in public administration and such employment remains fairly stable over time in St.Lucia.

Industry segmentation by gender is observed in all the countries; males outnumber females in employment in the 'agriculture', 'utility', 'construction', and 'transportation' sectors. Females concentrate in 'social services', 'retail' 'hotels' and 'domestic services'. It is only in Dominica that male numbers dominate in the public administration sector, but in the other countries, public administration is a female dominated employment sector. The utility and domestic services sectors in both countries are small in terms of their employment share. The LFS classifies the industries according to the International Standard Industrial Classification (ISIC) Rev 3.1 at the one-digit industry level.

Finally, about one-third of respondents in the selected countries reside in their respective capital cities and immediate environs. The respondents are aged 36 to 39 years on average, with the average age of employed women being consistently higher in Barbados in both time periods.

The foregoing review has identified clear differences and some similarities in selected labour market outcomes for Barbados, Dominica and St.Lucia. The subsequent comparative analyses of the empirical results for the selected research themes in this thesis will provide an opportunity to focus on the patterns and divergences obtained in terms of rates of return to education, the inter-industry wage structure, the public – private sector pay premium, and the gender pay gap.

Comparison of the Empirical Findings

Rates of Return to Education

The foregoing empirical analyses revealed that the estimates for the rates of return to education for the three selected Eastern Caribbean countries increase with educational attainment. This is in conflict with the findings noted in the empirical literature by Psacharoupolos and Patrinos (2004), but it is in accordance with findings obtained elsewhere in the empirical literature for the Eastern Caribbean (see Griffith 2001; Coppin 1996b).

The magnitude of the rates of return to education in the selected countries is broadly similar. However, the returns for Barbados are slightly lower compared to the corresponding rates for Dominica in 1999 and St. Lucia in 2004 (see table 8.2). The observed lower rates of return in Barbados are explained in part by the greater incidence of post-secondary education in that island. The summary statistics for Barbados and St. Lucia (see chapter 3) provide evidence to support the higher educational attainment at the post-primary levels in Barbados. The post-primary educational attainment in Barbados in 2003 is different from that in St.Lucia in 2004, by 35.3 percentage points and 14.8 percentage points for secondary and university education, respectively. In comparing the rates of return to education for the university level in Barbados in 1999 to that in Dominica in 1999, the return in Barbados is slightly lower by 2.5 percentage points. Similarly, a comparison of the Barbados rate of return in 2003 with the rate of return for St.Lucia in 2004 gives a 4.2 percentage point difference with return for Barbados being once again lower.

The delivery of state subsidized education in Barbados, from primary to university levels, has resulted in a larger supply of post-primary qualified individuals compared to the two other countries analysed in the thesis. Notwithstanding the lower rates of return in Barbados, particularly at the secondary level, compared with the rates derived here for Dominica and St. Lucia, the rates for university educated are broadly comparable. The returns to education in the Eastern Caribbean as evidenced in the available empirical literature points to rates of return closer to the rates found in developed

countries, with the observed rates in Barbados more compatible with the returns found in developed countries. The estimates of the rates of return to education for the pooled samples in Barbados, Dominica and St.Lucia are summarised in table 8.2 below. Note that due to the better educational outcomes in Barbados, respondents reporting no education was negligible, resulting in the use of primary education as the reference group in estimation. Thus in table 8.2 there is no comparative rate of return computation for this category for Barbados.

Table 8.2. Annualized Rates of Return to Educational Qualifications for Selected Eastern Caribbean Countries for pooled samples

	Barbados		Dominica	St. Lucia	
	1999	**2003**	**1999**	**1996**	**2004**
Primary	†	†	0.0151	0.0194***	0.0354***
			(0.0143)	(0.0066)	(0.0094)
Secondary	0.0399***	0.0384***	0.1098***	0.1034***	0.0734***
	(0.0027)	(0.0027)	(0.0111)	(0.0074)	(0.0090)
Tertiary	†	†	0.1512***	0.2214***	0.2089***
			(0.0340)	(0.0334)	(0.0282)
University	0.1461***	0.1986***	0.1706***	0.2322***	0.2401***
	(0.0047)	(0.0044)	(0.0376)	(0.0245)	(0.0261)

Notes:
(a) † indicates not applicable.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

The analysis for Dominica does not support separation by gender as determined by the Wald test (see chapter 5). However, in Barbados and St. Lucia the rates of return to primary and secondary education for females declined over time, while the returns for post-secondary education increased. For males, the rates of returns to primary and university education increase over time in St. Lucia, but contract for secondary and tertiary educated individuals. In Barbados, the rate of return at secondary level widens in 2003, compared to 1999, but the increase is found to be negligible. At the university level, the rate of return increases over time for males in Barbados, as is the case for St. Lucia. The increase in the rates of return to a university education in Barbados potentially reflects an increase in demand relative to supply for these tertiary level skills.

The findings support the general pattern reported in the empirical literature that rates of return to education are higher for females than males; as in this study returns to education for females are generally higher for all post-primary educational levels (see

table 8.3). The empirical evidence in Psacharoupolos et al. (2004) indicates that over time the returns to primary education declines. In the study there is evidence of a decline in the returns to secondary education over time for females in Barbados and St. Lucia. The outcome of declining rates of returns for females over time at the primary and secondary levels in the Eastern Caribbean is not peculiar as females are exceedingly better educated than males in the Caribbean labour markets. There are no other studies in the empirical literature that provides empirical evidence on the rates of return to education on a temporal basis for the Eastern Caribbean and it is safe to conjecture that over time the returns to primary education and secondary do in fact decline, but in the Eastern Caribbean the decline is apparently restricted to females. Psacharopoulos et al. (2004) also point to increases in the rate of return for higher education and the findings in the study mirrors this empirical evidence.

Table 8.3. Annualized Rates of Return to Educational Qualifications by Gender – St. Lucia and Barbados

Qualifications	St. Lucia				Barbados			
	1996		2004		1999		2003	
	Male	Female	Male	Female	Male	Female	Male	Female
Primary	0.0145*	0.0290***	0.0425***	0.0166	†	†	†	†
	(0.0086)	(0.0102)	(0.0111)	(0.0181)				
Secondary	0.0759***	0.1301***	0.0656***	0.0895***	0.0331***	0.0549***	0.0368***	0.0450***
	(0.0105)	(0.0102)	(0.0130)	(0.0127)	(0.0035)	(0.0041)	(0.0032)	(0.0046)
Tertiary	0.1843***	0.2424***	0.1023**	0.2925***	†	†	†	†
	(0.0592)	(0.0370)	(0.0420)	(0.0374)				
University	0.2311***	0.2664***	0.2426***	0.2609***	0.1271***	0.1676***	0.1777***	0.2188***
	(0.0314)	(0.0356)	(0.0390)	(0.0376)	(0.0068)	(0.0065)	(0.0068)	(0.0060)

Notes:
(a) † indicates not applicable to estimation.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

The use of 1999 LFS data for Dominica and Barbados provides an opportunity to test the differences in the educational returns across countries. The t-statistics for the differences in secondary education yields a statistically significant result indicating returns in Dominica are much greater than the observed returns in Barbados in 1999 with an absolute t-ratio of 6.1. Similarly the t-ratios for St.Lucia in 2004 compared to Barbados in 2003 again indicate that the returns to secondary education are lower in Barbados with statistically significant effects obtained for the pooled sample and females. The above supports the earlier evidence of differences in the rates of return to education in Barbados compared to Dominica and St.Lucia. The results for the t-statistics on the rates of return to education in table 8.4 provide further evidence on the similarities in the returns for Dominica and St.Lucia. Notwithstanding a three year

variation in the time frame for the estimated rates of return between Dominica and St.Lucia, the t-ratios for the different educational levels suggested all differences were indistinguishable from zero, thus pointing to high levels of conformity in the rates of return for the two countries.

Table 8.4. T-statistics for Differences in Rates of Return to Education

Education Level	Dominica 1999 vs. Barbados 1999	Dominica 1999 vs. St.Lucia 1996	St.Lucia 2004 vs. Barbados 2003		
	All	All	All	Male	Female
Primary	†	-0.2722	†	†	†
Secondary	6.1515***	0.5173	1.9821**	1.2186	1.7737*
Tertiary	†	-1.5198	†	†	†
University	0.6470	-1.4804	0.7730	1.8046*	0.9322

Notes:
(a) † indicates not applicable
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

The incidence of zero opportunity costs related to primary and secondary education in principle explains the lower returns to primary education in the Caribbean in contrast to other developing countries in Latin America and Africa. In the case of Africa, children are a productive resource as they contribute to household production. Moreover, with the widespread pandemic of diseases, children are expected to provide for their siblings following the loss of parents and the pursuit of education becomes a difficult option.

The high rates of return indicate that the well educated in the Eastern Caribbean receive a wage premium which in turn is likely to widen wage inequality. The end result is that those who lack educational qualifications fall behind and in many instances it is the poor who benefit the least from higher education. The expansion in the human capital endowment of the majority of the population should be a policy goal in both Dominica and St. Lucia through greater access to tertiary education. Barbados, on the other hand, should maintain the momentum and continue the expansion in tertiary education enrolment. Barbados has in place the enabling polices to attain this goal, as university education is free, unlike Dominica and St. Lucia where free education terminates at the end of secondary level. The pursuit of policies designed to enhance the human capital base in all three countries creates potential incentives for overseas firms to invest in the islands, and thus may be important as all three islands attempt to capture their share of internationally mobile foreign direct investment.

In summary, a comparison of the rates of return to education for Barbados, St.Lucia and Dominica provide results that vary in some respects from existing findings in the empirical literature for developing countries (see Psacharopoulos et al. 2004). The broad literature on the rate of return ascribes the highest rates of return to educational investment at the primary level. The converse result is found for the selected countries in this study; the rate of return to primary education is the lowest and the returns increase progressively with educational attainment. The rate of return results for Barbados, Dominica and St. Lucia are in comport with returns obtained in the literature for other Caribbean countries (see Griffith 2001 and Coppin 1996a; 1996b for Barbados). In the Eastern Caribbean, individuals with post-secondary educational attainment are consistently better rewarded in the labour market as they secure higher rates of returns to their educational investment. Also, women in the Caribbean receive higher returns to their investment in education. On a temporal basis the returns to post-secondary education exhibit stability as observed from the statistically insignificant t-ratios reported in table 8.4. The rates of returns to secondary education registers temporal change across the countries analysed in the thesis, with the changes in the rates of return to the secondary level being similar in Dominica and St.Lucia, but differing from those observed in Barbados. This is anticipated given the variation in the access to secondary education in Barbados (about three-fifths of the employed group) as compared to both Dominica and St.Lucia (about one-quarter of the employed group). In Barbados, the rates of return to secondary education remain relatively stable over time, while the returns to university education increases in the latter period (statistically so) vis-à-vis the earlier time period. This may be attributable to the fact that the relative demand for university educated workers in Barbados has increased faster than the relative supply.

The Inter-Industry Wage Structure

The industry wage structures in the Caribbean islands are of interest due to the gradual shift in economic sectors from agriculture to other activities in both St. Lucia and Barbados (see table 8.1). In all the countries in the study the pay disadvantage in

'agriculture' is sizeable for all the time periods (see table 8.5). Agriculture accounts for an estimated 25 percent of employment in Dominica in 1999, the highest contribution to employment in any of the selected countries and it is here that the 'agriculture' industry has the largest pay penalty below the employment weighted average.

The earnings of women attached to the 'hotel', and 'manufacturing' industries in Barbados are consistently below the employment weighted average over time. Earnings in the 'construction' industry in Barbados in 1999 are not statistically significantly different from the average. However, by 2003, workers in the industry receive on average and *ceteris paribus*, earnings that are 6.4 percent above the employment weighted mean. In 2000-02, the economy of Barbados experienced an economic downturn fuelled by changes in the international environment. The government in an effort to spur economic growth invested in large public sector capital projects (for example, the international airport and an extensive road rehabilitation programme) and the above average premium is likely attributable to this increased activity. The earnings of women in the 'construction' industry in Barbados are, on average and *ceteris paribus*, 34.3 percent above the female employment weighted average. The construction industry in the Caribbean is male-dominated and the female representation in the industry is small (one percent); presumably, the small number of women are in the more professional and clerical occupations within this sector that merit such a large premium.

Workers in 'finance' and 'transport industries earn sizeable premia above the employment weighted average across all time periods and generally across both gender groups (see table 8.6). The earnings premia in the 'transport' industries remains stable over time, but in the 'finance' industry the premia moves for example, in Barbados, from 21.6 percent (1999) to 40.8 percent (2003) above the weighted average *ceteris paribus*. The earnings premia in 'public administration' in 1999 in Barbados is above the employment weighted mean. However, this economy-wide premium is eroded by 2003, with females earning on average and *ceteris paribus* 13.6 percent below the employment weighted mean. By the latter period, a government imposed wage freeze was in effect as a public expenditure austerity measure in Barbados.

Table 8.5. Inter-industry Deviations for Dominica, St.Lucia and Barbados

One-Digit Industry Sector	Dominica	St.Lucia		Barbados	
	1999	**1996**	**2004**	**1999**	**2003**
Agriculture	-0.3683***	-0.2149***	-0.3374***	-0.1239***	-0.1890***
	(0.0471)	(0.0350)	(0.0458)	(0.0231)	(0.0204)
Manufacturing	0.0176	-0.1098***	-0.0792	-0.0561***	-0.0595***
	(0.0573)	(0.0360)	(0.0662)	(0.0164)	(0.0202)
Utility	0.4497***	0.2438**	0.3920**	-0.0132	-0.0258
	(0.0968)	(0.0948)	(0.1700)	(0.0346)	(0.0349)
Construction	0.3163***	0.2219***	0.1967***	-0.0180	0.0600***
	(0.0656)	(0.0386)	(0.0475)	(0.0136)	(0.0146)
Retail	0.0551	-0.0100	0.0326	-0.0426***	-0.0298**
	(0.0433)	(0.0374)	(0.0381)	(0.0127)	(0.0138)
Hotels	0.0478	0.1900***	0.0387	-0.0434***	0.0265*
	(0.1044)	(0.0382)	(0.0408)	(0.0143)	(0.0145)
Transport	0.2933***	0.2661***	0.1335*	0.2056***	0.1903***
	(0.0639)	(0.0520)	(0.0703)	(0.0263)	(0.0246)
Finance	0.2349***	0.2553***	0.1873***	0.1949***	0.3405***
	(0.0546)	(0.0644)	(0.0632)	(0.0188)	(0.0197)
Public Administration	0.1614**	0.0745	0.1125**	0.0662***	-0.0456
	(0.0823)	(0.0567)	(0.0557)	(0.0193)	(0.0293)
Social Services	0.0934	-0.1727***	-0.0053	†	†
	(0.0655)	(0.0631)	(0.0506)		
Domestic Services	-0.3812***	-0.3576***	-0.3321***	†	†
	(0.1089)	(0.0622)	(0.0733)		
General Services	†	†	†	-0.0556***	-0.0679***
				(0.0106)	(0.0133)
Overall Variability (Krueger & Summers)	0.2549	0.1845	0.1820	0.0819	0.1147
Overall Variability (Haisken-DeNew & Schmidt)	0.2471	0.1787	0.1736	0.0802	0.1129

Notes:
(a) The calculations for Dominica are based on the augmented (2) equation from table 5.2 in Chapter 5.
(b) The calculations for St.Lucia are based on the augmented equations from table 6.7 in Chapter 6.
(c) The calculations for Barbados are based on the augmented equations from table 7.5 in Chapter 7.
(d) See expression [8] in chapter 4 for the relevant formula for the industry deviations.
(e) The overall variability measure summarizes the variability in the deviations around the mean. See Haisken-DeNew and Schmidt (1997) for the computational details.
(f) † denotes not applicable in estimation.

The estimate of the overall variability in inter-industry wage dispersion, regardless of the dispersion measure used, is high in Dominica (0.25) and St. Lucia, (0.18), and the overall dispersion remains stable over time in the latter island. The dispersion in the industry wage structure in Dominica and St. Lucia is smaller for females than males, with a modest reduction noted for St. Lucian females in the latter period. The estimates of overall variability in the inter-industry wage dispersion in Barbados are in conflict with that observed in Dominica and St.Lucia. The variability in the inter-industry wage structure is low at 0.08 in 1999. However, by 2003 the overall variability increases to 0.11. The increase in the overall variability in the inter-industry wage structure over time is unlike that observed in St. Lucia, where the variability in the inter-industry wage

structure remained relatively stable. The inter-industry wage structure in Barbados also differs further from that in the other two countries in that the overall variability in the inter-industry wage dispersion is higher for females than males in both years. In 2003, there is a significant increase in the overall variability in the inter-industry wage dispersion for females to about 0.16, and largely similar to the outcome for St. Lucian females in 2004 (0.14). The differences across countries in the overall variability in wage dispersion yields statistically significant estimates on the basis of conventional F-tests.[2]

Table 8.6. Inter-industry Deviations by Gender for St.Lucia and Barbados

	St.Lucia				Barbados			
One-Digit Industry Sector	**1996**		**2004**		**1999**		**2003**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Agriculture	-0.2641***	-0.1336**	-0.3585***	-0.2756***	-0.1336***	-0.1203***	-0.1755***	-0.2068***
	(0.0418)	(0.0603)	(0.0539)	(0.0857)	(0.0312)	(0.0315)	(0.0257)	(0.0332)
Manufacturing	-0.0555	-0.1257***	0.1391	-0.2006***	-0.0117	-0.0971***	-0.0048	-0.1088***
	(0.0682)	(0.0424)	(0.1086)	(0.0741)	(0.0228)	(0.0235)	(0.0273)	(0.0300)
Utility	0.2040**	0.2084	0.5131***	-0.3501	-0.0097	-0.0209	-0.0041	-0.0388
	(0.1044)	(0.1682)	(0.1729)	(0.2163)	(0.0413)	(0.0617)	(0.0506)	(0.0481)
Construction	0.1803***	0.4154***	0.1530***	0.2236	-0.0349***	0.0530	0.0262*	0.2945***
	(0.0393)	(0.1127)	(0.0485)	(0.1491)	(0.0138)	(0.0514)	(0.0152)	(.0701)
Retail	0.0198	-0.0127	0.0242	0.0500	-0.0314	-0.0464***	-0.0187	-0.0206
	(0.0590)	(0.0475)	(0.0602)	(0.0483)	(0.0206)	(0.0157)	(0.0200)	(0.0200)
Hotels	0.2036***	0.1935***	0.0336	0.0566	-0.0333	-0.0439***	-0.0273	0.0932***
	(0.0567)	(0.0515)	(0.0596)	(0.0578)	(0.0234)	(0.0177)	(0.0203)	(0.0211)
Transport	0.2371***	0.2963***	0.1441*	0.1582	0.1428***	0.3585***	0.1447***	0.2898***
	(0.0562)	(0.1077)	(0.0794)	(0.1366)	(0.0300)	(0.0504)	(0.0283)	(0.0478)
Finance	0.2985***	0.1747*	0.1598*	0.2014**	0.1650***	0.2097***	0.2760***	0.4064***
	(0.0819)	(0.1015)	(0.0900)	(0.0877)	(0.0309)	(0.0241)	(0.0336)	(0.0255)
Public Administration	-0.0594	0.1851**	0.1001	0.1091	0.0746***	0.0561**	-0.0044	-0.1276***
	(0.0803)	(0.0798)	(0.0858)	(0.0728)	(0.0293)	(0.0251)	(0.0402)	(0.0441)
Social Services	-0.3632***	-0.1086	-0.0944	0.0516	†	†	†	†
	(0.1018)	(0.0735)	(0.0800)	(0.0628)				
Domestic Services	-0.4244***	-0.3039***	-0.4222**	-0.2776***	†	†	†	†
	(0.1023)	(0.0691)	(0.1708)	(0.0790)				
General Services	†	†	†	†	-0.0432***	-0.0563***	-0.0557***	-0.0566***
					(0.0160)	(0.0141)	(0.0175)	(0.0204)
Overall Variability (Krueger & Summers)	0.2030	0.1705	0.2047	0.1582	0.0698	0.0982	0.0832	0.1631
Overall Variability (Haisken-DeNew & Schmidt)	0.1939	0.1573	0.1909	0.1394	0.0658	0.0954	0.0787	0.1600

Notes:

(a) The calculations for St.Lucia are based on the augmented equations from table 6.7 in Chapter 6.
(b) The calculations for Barbados are based on the augmented equations from table 7.5 in Chapter 7.
(c) See expression [8] in chapter 4 for the relevant formula for the industry deviations.
(d) The overall variability measure summarizes the variability in the deviations around the mean. See Haisken-DeNew and Schmidt (1997) for the computational details.
(e) The inter-industry wage structures for men and women were computed from the gender-specific log earnings equations.
(f) † denotes not applicable in estimation.

The inter-industry wage differentials across the selected Eastern Caribbean are assessed over time by the use of t-ratios. An assessment of the temporal changes in the inter-industry wage structure in Dominica and Barbados in 1999 reveals that the change in inter-industry earnings differentials in 'agriculture' is far greater in Dominica, which yields a statistically significant earnings effect below the employment weighted average. Meanwhile, the changes in earnings in the 'utility', 'construction' and 'retail' sectors between the two countries over time are higher in Dominica rendering statistically significant absolute t-values of 4.5, 5.0 and 2.2 respectively.

Table 8.7. T-statistics for Inter-Industry Wage Differentials across Countries

	Dominica 1999 vs. Barbados 1999			**St.Lucia 2004 vs. Barbados 2003**			**Dominica 1999 vs. St.Lucia 1996**		
	All	Male	Female	All	Male	Female	All	Male	Female
Agriculture	-4.6564***	-0.5478	-1.2278	-2.9618***	-3.0681***	-0.7489	-2.6143***	-0.2683	-1.0187
Manufacturing	1.2365	1.3910	0.5024	-0.2836	1.2846	-1.1487	1.8810*	1.5018	0.7548
Utility	4.5026***	4.8056***	1.2744	2.4071**	2.8705***	-1.4050	1.5197	2.2856**	0.0307
Construction	4.9925***	5.3337***	3.1170***	2.7525***	2.4968**	-0.4306	1.2408	1.8184*	0.8190
Retail	2.1682**	3.1463***	0.6056	1.5389	0.6756	1.3518	1.1391	1.7231*	0.0776
Hotels	0.8651	0.4630	0.3545	0.2816	0.9673	-0.5945	-1.2795	-0.4621	-1.6191
Transport	1.2689	2.7195***	-1.6888*	-0.7630	-0.0064	-0.9088	0.3306	1.2804	-0.9950
Finance	0.6934	-0.4778	1.4592	-2.3136**	-1.2095	-2.2448**	-0.2417	-1.5675	1.2477
Social Services 1/	†	†	†	†	†	†	0.8696	1.9446*	-0.6497
Public Administration	1.1267	1.1204	1.4144	2.5125**	1.1030	2.7790***	2.9275***	2.0802**	2.6165***
Domestic Services 1/	†	†	†	†	†	†	-0.1884	3.0753***	-1.4376

Notes:
(a) 1/ Domestic services and social services are not included within the Barbados industry groupings.
(b) † denotes not applicable

Given the three-year time difference in the analysis of the changes in the inter-industry wage structure between Dominica (1999) and St.Lucia (1996) it is only expected that the decline in 'agriculture' in Dominica is greater and statistically below the employment weighted average. In addition, the temporal changes in 'public administration' yields a statistically significant result with $|t| = 2.9$. Overall the findings for the differences in the inter-industry wage structure between Dominica and St.Lucia given the three year time span confirms the existence of similarities in the economic structure of the countries and which in turn are mirrored in the inter-industry wage structure of the two countries. The statistically significant differences in the inter-industry wage structure for St.Lucia in 2004 vis-à-vis Barbados in 2003 identifies

noteworthy differences in 'agriculture', 'finance', 'public administration', 'utility' and 'construction' (see table 8.7).

The differences in the inter-industry structure for Barbados versus St. Lucia and Dominica are likely explained, among many other things, by differences in the macroeconomic performance of the three countries. In addition, the differences may be influenced by market forces and institutional factors such as the structure of wage negotiations, degree of union bargaining power[3] and the incomes policy of government (see Edin and Zetterberg 1992). The magnitude of overall variability in the inter-industry Barbados in relation to the other two islands potentially highlights some level of greater corporatism in the wage bargaining structure as evidenced in this island's ranking in table 8.8. Its dispersion measure situates it closer to those European countries with a strong corporatist tradition. However, the degree of such corporatism is likely to be fairly modest.

Table 8.8. Dispersion of Inter-Industry Wage Differentials by Country

	Year	Dispersion of Inter-Industry Wage Differentials
Sweden	1981	0.0436
Austria	1983	0.0502
Denmark	1990	0.0538
France	1992	0.0576
Finland	1987	0.0646
Netherlands	1985	0.0664
Belgium	1995	0.0740
Barbados	**1999**	**0.0819**
Norway	1989	0.0852
Germany	1988	0.1100
Switzerland	1991	0.1130
Ireland	1996	0.1130
Canada	1986	0.1365
USA	1988	0.1411
UK	1991	0.1427
St.Lucia	**1996**	**0.1845**
Dominica	**1999**	**0.2549**

Source: Gannon and Nolan (2004) and thesis estimates for Barbados, Dominica and St.Lucia

In summary, in all three countries, workers in the 'agriculture' industry consistently and unsurprisingly receive pay which is well below the employment weighted average. This shows the effects on the agriculture sector in these countries, given the loss of preferential EU market access for bananas (St. Lucia and Dominica) and sugar (Barbados). In the Eastern Caribbean, individuals in the 'finance' and 'transport' industries receive a sizeable earnings premia and these findings are in line with the transition to a services based economy.

The Public Sector Pay Premium

An understanding of pay premia in the public sector is informative in light of the recent public sector reform programmes undertaken in the Eastern Caribbean countries. In Dominica in 2003, the Government, on the advice of the IMF, implemented a five percent wage freeze in the public sector. The other countries experimented with a phased introduction of performance management systems. In Barbados in 2002, a flexibility responsibility allowance was introduced to compensate certain categories of public sector workers (i.e., police, prison and nursing officers) for extra hours worked (See IDB 2002). In January 2004, St.Lucian civil servants received a three percent salary increase as part of the collective bargaining process with public sector unions (see Government of St.Lucia 2004a). The nature of compensation in the Caribbean public sector is constantly changing and the empirical analysis reported in earlier chapters of the thesis sheds some light on the pay premia in this sector.

The public-private sector pay gap analysis was undertaken using the Mincerian earnings regression model augmented to include controls for industry, district and employment status (i.e., public sector, private sector and self-employed). The results for the public-private sector pay gap are in conflict for the selected countries (see table 8.9). In Dominica, public sector workers receive a premium which is statistically significant and positive as compared to individuals in the private sector, the reference group. In 1999, the male gender group in Dominica receive an earnings premium whilst women in the labour market are not comparably remunerated.

In St.Lucia the earnings of public sector employees are not statistically different from the earnings of individuals in the private sector, except for males in 1996, who receive earnings that are, on average and *ceteris paribus*, 21.3 percent above earnings in the private sector. This is similarly the case for males in Dominica in 1999. By 2004, males in St.Lucia lose the earlier pay advantage and women now register an earnings premium, on average and *ceteris paribus*, that is 19.1 percent above that in the private sector.

Table 8.9. Public Sector Pay Premium and Gender Pay Gap

	Dominica	St.Lucia		Barbados	
	1999	1996	2004	1999	2003
Public Sector Pay Premium					
Raw (or unadjusted) public sector pay premium	0.4878*** (0.0625)	0.4735*** (0.0439)	0.4526*** (0.0476)	0.2542*** (0.0126)	0.3535*** (0.0138)
Ceteris paribus (or adjusted) public sector pay premium 1/	0.1322** (0.0663)	0.1162 (0.0724)	0.0561 (0.0664)	0.0678*** (0.0242)	0.2192*** (0.0377)
Gender Pay Gap					
Raw (or unadjusted) gender pay gap	0.2015*** (0.0504)	0.3654*** (0.0324)	0.1448*** (0.0385)	0.1301*** (0.0107)	0.1804*** (0.0117)
Ceteris Paribus (or adjusted) gender pay gap 2/	0.2376*** (0.0519)	0.4309*** (0.0336)	0.2164*** (0.0374)	0.1246*** (0.0116)	0.1656*** (0.0107)
Ceteris Paribus (or adjusted) gender pay gap 3/	0.1840*** (0.0545)	0.1933*** (0.0387)	0.1664*** (0.0372)	0.1222*** (0.0116)	0.1736*** (0.0106)

Notes:
(a) 1/ reports the *ceteris paribus* public sector pay premium from the augmented specifications in the respective country chapters.
(b) 2/ reports the *ceteris paribus* gender pay gap from the basic Mincerian specification in the respective country chapters.
(c) 3/ reports the *ceteris paribus* gender pay gap from the augmented specification in the respective country chapters.
(d) The public sector pay premium and the gender pay gap as reported in the table are the coefficients in log-points.

In Barbados, in 1999, there is an overall pay premium in the public sector, however, once analysed by gender, women are the ones who benefit from the public sector pay premium. By 2003, the public sector pay premium has not only increased, but now the earnings of men are above that of those in private sector employment. The pay advantage for women in 2003 is sizeable, with the public sector pay premium on average and *ceteris paribus* 46.8 percent above that in the private sector. Table 8.10 presents the public sector pay premiums by gender.

Table 8.10. Public Sector Pay Premium by Gender

	Dominica	St.Lucia		Barbados	
	1999	1996	2004	1999	2003
Male	0.1629** (0.0801)	0.1937** (0.0855)	-0.0499 (0.0955)	0.0154 (0.0355)	0.1081** (0.0505)
Female	0.1509 (0.1126)	0.0576 (0.0922)	0.1748* (0.0920	0.1207*** (0.0330)	0.3839*** (0.0580)

Notes:
(a) The public sector pay premiums are the *ceteris paribus* estimates from the augmented specification.
(b) The public sector pay premiums as reported in the table are the coefficients in log-points.

The use of t-statistics to test the differences in the public sector pay premium suggests that the public sector pay premium in Dominica in 1999 is statistically and significantly different from the pay premium of males in Barbados in 1999. The public sector pay

premia for the pooled and female samples in St.Lucia in 2004 are statistically significantly below those of the comparable groups in the Barbados 2003 samples. The public sector premia in the Dominica 1999 and St.Lucia 1996 samples are statistically indistinguishable from zero (see table 8.11).

Table 8.11. T-statistics for Temporal Differences in Public Sector Pay Premium and Gender Pay Gap

	Dominica 1999 vs. Barbados 1999	St.Lucia 2004 vs. Barbados 2003	Dominica 1999 vs. St.Lucia 1996
Public Sector Pay Premium			
All	0.9127	-2.1361**	0.1633
Male	1.6855*	-1.4623	-0.2621
Female	0.2575	-1.9129*	0.6413
Gender Pay Gap	1.1092	-0.1869	-0.1391

Note:
(a) The t-ratios for the public sector pay premium and the gender pay gap are derived from the augmented specification.

In summary, as reported by the empirical results, in Dominica and St. Lucia in the 1990s only males in the public sector receive an earnings premium. In Barbados, in the 1990s, it is women who are in receipt of the earnings premium and not males. However, by the 2000s males in St.Lucia lose their public sector pay advantage and women receive sizeable pay premia. In Barbados, the premium in the public sector widens significantly, but it is women who are the biggest winners. This highlights the important role played by the public sector in reducing the gender pay gap. In contrast to the work of Panizza (2000), the public sector pay premia in these three islands are considerably higher than in most Latin American countries, where it is generally negative. However, our finding in regard to gender, where women benefit substantially in wage terms from public sector employment is largely consistent with the findings of Panizza (2000). Overall, the empirical analysis does suggest a great deal of flux and change in public sector wage rewards over time and across islands.

The Gender Pay Gaps

In all three countries under review there is a sizeable gender pay gap in favour of men (see table 8.9). Females on the whole in the Caribbean are generally concentrated in industries with low remuneration.[4] It is also generally argued that where females are in

industries with higher remuneration, they are generally not in managerial positions thus explaining the existence of gender pay gaps. Psacharopoulos and Tzannatos (1992), using data from the 1980s, find that in Latin American countries one-third of the wage gap is attributed to human capital endowments, with a significant component the gender wage gaps remaining unexplained. In the past males had higher educational attainment than females, however according to Duryea, Galiani, Ñopo and Piras (2007) by the mid-2000s most countries in the Latin American and Caribbean region closed the educational attainment gender gap. In fact, in Barbados, Dominica and St. Lucia, the educational attainment of females has surpassed that of males at the post-secondary level, and a review of the summary statistics tables in chapter 3 highlights this reversal.[5] An analysis of the LFS data for the selected countries suggests that females have a propensity to seek employment in certain industry groups. In the region, females tend towards employment in 'retail', 'hotel' and social sector type activities. In most cases, the remuneration in these sectors is low and contributes to the existence of the gender earnings gap. However, once we control for industry affiliation, a *ceteris paribus* gender pay gap still exists, so other factors are clearly at work here. An area for reflection is whether the inclination by women to cluster within certain industry groups is connected to inherent features of the educational system or in part due to other unexplained factors.

The average *ceteris paribus* male pay advantage is highest in St.Lucia in 1996, at 21 percent, followed by Dominica with an average *ceteris paribus* male pay advantage of 20.2 percent in 1999. By 2004, the average *ceteris paribus* male pay advantage declines to 18.1 percent in St. Lucia. Again, in Barbados the labour market earnings determination processes vary from that in the other two countries. In 1999, the average *ceteris paribus* male pay advantage is low at 14.1 percent, but by 2003 the gender pay gap had widened to an average *ceteris paribus* male advantage of 20.7 percent. The computations of the t-ratios for the differences in the gender gap pays across countries are outlined in table 8.11 above and suggest no difference in *ceteris paribus* gender pay gaps across all three countries for the closest comparable years.

The availability of data for Barbados and St.Lucia over time allows for the analysis of the evolution in the gender pay gap over two broadly similar time periods. The raw (or unadjusted) gender pay gap is highest in St. Lucia in 1996 at 44.1 percent, but declines

significantly by 2004. In Barbados the raw (or unadjusted) pay gap starts off low but increases over time (see table 8.9).

The raw (or unadjusted) gender pay gap and the *ceteris paribus* gender pay gap are broadly similar and thus suggest that the remuneration received by males is not due to their possession of higher skills, educational attainment or other wage determining factors compared to women. The findings suggest that the treatment effect rather than the endowment effect dominates. Hence, it could be argued that in Caribbean labour markets the gender wage gap is largely attributable to the exercise of unequal treatment of women or, to put it more explicitly, their labour market discrimination. The evidence in the summary statistics tables (see chapter 3) indicates that more women are in possession of post-secondary education than males. The discrimination of women in Caribbean labour markets may be attributable to the jobs they do within the industries in which they concentrate. We have controlled for one-digit-industry but not for the occupations women do within this industry and if women are concentrated within the lower paid occupations within these industries, this could explain part of the treatment effect. A female pay disadvantage is also common in the empirical literature for Latin American countries and it is generally attributed to treatment effects, (i.e., discrimination), as opposed to differences in the endowments of women in the labour markets (see Psacharopolos et al. 1992; Panizza, 2000).

The evidence on the narrowing of the gender pay gap over time is inconclusive as the point estimate for the gender pay gap has narrowed in St.Lucia but not statistically so, and has widened in Barbados over the two years for which data are available. Further research analysing LFS data for more recent years is required to provide conclusive evidence on the temporal movement in the gender pay gap in the Eastern Caribbean.

Conclusions

The successful estimation of the labour market earnings determination processes for the three Eastern Caribbean countries, on the basis of adequate goodness-of-fit criteria, confirms the robustness and broad applicability of Mincerian earnings functions. In

addition, the findings revealed certain levels of heterogeneity in the Caribbean labour markets, but also detected some similarities that point to inherent features of the economic and labour market structures shared by the three selected countries.

The estimates on the rates of return to education for Barbados, St. Lucia and Dominica differ from the conventional patterns in the empirical literature for developing countries (see Psacharopoulos et al. 2004). However, the estimates for the three countries are broadly similar and mirror those found in the empirical literature for the Caribbean (see Griffith 2001 and Coppin 1996a). The study has found a Caribbean pattern for the rates of return to educational attainment with the rates lowest for primary education and increasing progressively with educational attainment. In fact, according to the new evidence in the literature (see Colclough, Kingdon and Patrinos 2010), the new pattern observed here is a departure from that originally found by Psacharopoulos et al. (2004). In addition, the rates of return for women are higher than those for men. In comport with the broad empirical literature, the rates of return at the lower educational levels (i.e., primary and secondary educational levels) have somewhat contracted over time, while returns at the higher educational levels have increased over time. The level of development in Barbados, and the greater access to education, has resulted in a relative abundance of highly educated workers and consequently rates of returns at the university level that are lower than those in Dominica and St.Lucia, though still slightly higher than those in developed countries. In the Eastern Caribbean the labour market places a high value on post-secondary education and this clearly points to the existence of incentives for greater investment in post-secondary education.

The inter-industry wage structure in the Eastern Caribbean is somewhat similar across the countries, with employees in roughly the same set of industries earning premia either above or below the employment weighted mean. In all the selected countries, earnings in the 'agriculture' industry are, not surprisingly, below the employment weighted average. This confirms the movement away from the agriculture sector consequent on the loss of preferential access to EU markets for bananas (St. Lucia and Dominica) and sugar (Barbados). In the Eastern Caribbean, individuals in the 'finance' and 'transport' industries receive sizeable earnings premia.

The empirical results on the public-private sector pay gap appear to vary across the selected countries. In Dominica and St. Lucia in the 1990s only males in the public sector receive an earnings premium. In Barbados, in the 1990s, it is women who are in receipt of the earnings premium and not males. However, by the 2000s males in St.Lucia lose the public sector pay advantage and women receive sizeable pay premia. In Barbados, the premium in the public sector widens significantly, but it is women in public sector jobs who are the biggest winners. All of the above evidence points to a great degree of flux and change over time in the public sector labour markets of these three Caribbean islands.

Finally, the magnitudes of the gender pay gaps are fairly sizeable in all three countries reviewed here and there is evidence in all three cases that most of the gap is attributable to treatment rather than endowment effects. The trend in the gender pay gaps is unclear though there is evidence of stability over time but some indication of a widening gap in Barbados.

ENDNOTES

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[1] see www.cred.be

[2] Utilizing the Haisken-DeNew and Schmidt overall variability measure for wage dispersion to derive F-tests yields results as follows: Dominica (1999) vs. St.Lucia (1996), F = 1.92; Dominica (1999) vs. Barbados (1999), F= 9.47; St.Lucia (1996) vs. Barbados (1999), F = 4.92.

[3] Trade unionism in Barbados dates back to the Independence period in 1966, with the vibrancy of the trade union movement holding strong post-independence. The Barbados Workers Union and the National Union of Public Workers are the main unions for public sector collective bargaining. Private sector employees are represented by the Barbados Employers' Confederation (see IMF 2004).

[4] Females in the samples for the selected countries mainly congregate in 'manufacturing', 'retail', 'hotels', 'social and general services', the lower paying industries.

[5] In Barbados in 2003, about 24 percent of females hold university qualifications compared to 15 percent of males. In Dominica in 1999 an estimated 15 percent of females have post-secondary qualifications compared to 11 percent of males. Similarly in St. Lucia whilst 20 percent of females are educated beyond the post-secondary level only 11 percent of males hold these qualifications.

CHAPTER 9: SOME ALTERNATIVE ESTIMATION PROCEDURES AND AN ANALYSIS OF THE ROBUSTNESS OF RESULTS

Introduction

This chapter provides further analysis and extended for the original interval regression model (IRM) to determine the robustness of the results obtained in the earlier empirical chapters. Firstly, the probit selection model is re-estimated and the age dummies used in the original selection equation are removed and replaced by the continuous age variable. Once estimated, the selection term is inserted into the earnings equation, and in this regression model the age and age squared variables are removed. The removal of the age and age squared variables are excluded to assess the sensitivity of the selection effects to different identifiers and to investigate the extent to which the tenure variables in the earnings equation absorb some of the age effects.

Second, the original specification is re-estimated by Ordinary Least Squares (OLS), with the independent variables retained as in the original interval regression model, but with the dependent variable now constructed as the logarithm of the midpoint of the monthly wage intervals. In the original selection model, the model is estimated with the use of gender interactions to capture gender effects. The use of the fully gender interactive selection model is equivalent to estimating separate gender-specific selection models. In order to make the OLS results directly comparable with the original interval regression model estimates reported in the earlier chapters, the same variables are included in the gender interactive selection model.

Variants of the Probit Results – IRM Results

In the empirical literature the probit model uses identifying instruments which are taken to affect participation into the labour market but not the level of earnings. In the design of the Caribbean labour force surveys information on marital status, the number and age

of dependent children in household, the incidence of a disability, the presence of other income earners in the household and other questions of this type shed light on selection into the labour market. However, these types of questions are either not asked in such LFS surveys, if asked, they are not responded to in sufficient numbers to render usable information. This is a limitation because variables based on these types of questions usually provide good identifying instruments for selection modelling. In the case of the countries under review where variants of these questions are asked the responses are generally characterised by missing values, thus indicating limited responses to these questions. Also, given the LFS are governed by the relevant national Confidentiality Act, the data used in this thesis were provided without person and household identifiers. As a result of this, it proved impossible to construct variables for marital status and the number of dependent children in the household using, for example, information on the head of household variable.

The ensuing analysis reports the outcome of a probit model estimated with the age dummies replaced by a continuous age measure in an equation containing the complete set of gender interactions. The findings for the above probit model are then compared with the results from the original probit that includes age dummies and gender interactions for each country.

Dominica Probit Model

The goodness-of fit measure in the original probit is eight percentage points better than in this adjusted probit. Given that the interactive coefficients are not reported in the following tables to conserve space, the estimates for the relevant variables all refer to the female effects. The coefficient on (female) age is statistically significant at the one percent significance level. This was also the case for the set of age dummies in the original probit specification. In the original probit the effect of age on participation through the use of the age dummies yielded coefficients which allowed the age effect to vary across age categories. In particular, the magnitudes rose progressively form ages 22 – 49 years and then declining somewhat at agedum_5, the group comprising female individuals aged 50 years and over. The likelihood of being employed is now far more dependent on post-primary education and residence in the capital city or in the north

eastern agricultural belt of St. David. In this re-estimated version, the estimated effect for the Carib ethnic group has been rendered statistically insignificant for female, given that in the original model it was just on the cusp of statistical significance. Overall, however, there is no consistent pattern in the change in the coefficients, for say the education and district coefficients. The re-estimated probit results for Dominica are presented in table 9.1.

Table 9.1. Probit Model for Employment in Dominica with Age Variable

Variables	Probit Coefficient
Constant	-1.1620***
	(0.3064)
HOH	0.4575***
	(0.1048)
Age	0.0126***
	(0.0036)
Male	0.3501
	(0.4310)
Carib	0.3839)
	(0.2548)
Primary	0.1084
	(0.2226)
Secondary-Incomplete	0.2750
	(0.3326)
Secondary	0.5939**
	(0.2389)
Tertiary	1.1226***
	(0.2766)
Education other	1.1785*
	(0.7117)
University	1.6123***
	(0.4757)
Roseau City	0.3923**
	(0.1636)
St. John	0.1189
	(0.2047)
St. Joseph	0.0723
	(0.2038)
St. Paul	0.2253
	(0.1932)
St. Luke	-0.2658
	(0.2276)
St. Patrick	-0.1296
	(0.1898)
St. David	0.3936*
	(0.2051)
St. Andrew	0.2263
	(0.2548)
Male×HOH	0.1352
	(0.1583)
Male×Age	0.0035
	(0.0057)
Male & Education Interactions (5)	Yes
Male & District Interactions (8)	Yes
Sample Size	1920
Log-Likelihood Value	-1105.2
McFadden R^2	0.1483

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

St. Lucia Probit Model

In both years the goodness –of- fit measure in the adjusted probit is lower compared to the original probit which included the age dummies. The lower explanatory power of the independent variables in the re-estimated probit is similar to the case of Dominica. In 1996, the coefficients for males and education are statistically significant and bear the same sign as in the original probit. In addition, the coefficients on the district variables have retained their significance levels where applicable and exhibit the same signs. In the re-estimated probit, age is not a factor which statistically influences participation, while in the original probit all age groups, except for individuals aged 50 years and above, are seen to be statistically significant. In the case of the Caribbean, it is difficult to conceive age as not having an effect on participation and this may reflect the mis-specification of the age variable in this case. The use of age categories would appear to provide a better proxy for the role of age effects than the continuous measure. In the re-estimated probit the head of household has a greater likelihood to participate in the labour market, but by the latter period this declines slightly. In terms of the differences between the original probit and the re-estimated probit, the significance levels and signs are retained. The full set of re-estimated probit results for both years for St.Lucia are detailed in table 9.2.

Table 9.2. Probit Model for Employment in St.Lucia with Age Variable

Variables	Probit Coefficient	
	1996	**2004**
Constant	-0.5002***	-1.2392***
	(0.1393)	(0.1859)
HOH	0.5503***	0.5324***
	(0.0663)	(0.0733)
Age	0.0012	0.0041
	(0.0025)	(0.0027)
Male	0.4296**	0.3463
	(0.2101)	(0.2496)
Primary	0.2803***	0.5588***
	(0.0890)	(0.1335)
Secondary-Incomplete	-0.6566***	-0.0393
	(0.1336)	(0.1877)
Secondary	0.4180***	0.8479***
	(0.1063)	(0.1467)
Tertiary	0.5115***	1.3719***
	(0.1568)	(0.1698)
Education Other	-0.5358	0.3329
	(0.3632)	(0.3061)
University	0.7743***	1.6872***
	(0.2382)	(0.2405)
Castries City	-0.1011	0.0397
	(0.1126)	(0.1197)
Anse LaRaye	-0.1566	-0.2769*
	(0.1337)	(0.1533)
Soufriere	0.2394*	-0.0811
	(0.1440)	(0.1334)
Choiseul	0.1504	-0.4215**
	(0.1360)	(0.1808)
Labourie	-0.2932**	-0.3154**
	(0.1287)	(0.1571)
Vieux Fort	-0.0405	-0.5125***
	(0.1086)	(0.1269)
Micoud	-0.3934***	0.0070
	(0.1019)	(0.1094)
Dennery	0.5803***	-0.0130
	(0.1006)	(0.1267)
Gros Islet	-0.0122	-0.2937***
	(0.1009)	(0.1106)
Male×HOH	0.3637***	0.0820*
	(0.1063)	(0.1130)
Male×Age	-0.0005	0.0081*
	(0.0041)	(0.0042)
Male & Education Interactions (6)	Yes	Yes
Male & District Interactions (9)	Yes	Yes
Seasonality Controls	Yes	Yes
Sample Size	3994	3349
Log-Likelihood Value	-2351.485	-1968.846
McFadden R^2	0.1492	0.1299

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Barbados Probit Model

The goodness of fit measures in the original specification are slightly superior to those for both years compared to the re-estimated probit model. In 1999, in contrast to the original probit, secondary education and the other education variables, and stratum_4 all exert a statistically significant effect on participation for women.

Table 9.3. Probit Model For Employment in Barbados with Age Variable

Variables	Probit Coefficient 1999	Probit Coefficient 2003
Constant	-0.8989***	-0.8414***
	(0.0907)	(0.0847)
HOH	0.3761***	0.3866***
	(0.0427)	(0.0405)
Age	0.0148***	0.0135***
	(0.0016)	(0.0015)
Male	0.5810***	0.2306*
	(0.1332)	(0.1239)
Secondary	0.6206***	0.6015***
	(0.0510)	(0.0507)
Technical vocational	0.8676***	0.7185***
	(0.1435)	(0.1069)
Education other	0.4997*	0.3302
	(0.2743)	(0.2246)
University	0.9516***	0.8940***
	(0.0691)	(0.0603)
Stratum2	0.0550	0.0493
	(0.0447)	(0.0414)
Stratum3	0.0754	0.1627***
	(0.0499)	(0.0463)
Stratum4	0.1181***	0.0241
	(0.0506)	(0.0508)
Male×HOH	-0.0161	0.0101
	(0.0671)	(0.0625)
Male×Age	0.0022	0.0076***
	(0.0026)	(0.0023)
Male & Education Interactions (4)	Yes	Yes
Male & Stratum Interactions (3)	Yes	Yes
Sample Size	8410	9740
Log-Likelihood Value	-6051.248	-6893.751
McFadden R^2	0.0721	0.0734

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

In 2003, the constant term is now statistically significant unlike the case in the original probit. Here also all the coefficients on female education are statistically significant which is unlike the case in the original probit where only secondary and university education are seen to have an effect on participation. In this probit model, females residing in stratum_4 are more likely to participate in the labour market as compared to individuals in the base group. However in the original model, females in stratum_3 were the only group likely to participate in the labour market. In all years the coefficients

retain the same signs as those in the original model despite change in some cases in terms of their significance levels. The movements over the two time periods in the re-estimated probit mirror exactly the coefficient changes in the original probit. The probit results for Barbados are detailed in table 9.3.

Discussion of Earnings Regression Models for Re-estimated IRM

The adjusted IRM is estimated without age and age squared included in the set of explanatory variables while the selection term inserted into the earnings equation is derived from a selection equation that contained the continuous age variable as opposed to the use of age dummies as in the original selection equation specification. The following discussion compares the results solely for the basic Mincerian model of the re-estimated IRM with those obtained from the original IRM for Dominica, St. Lucia and Barbados. The use of the basic Mincerian specification for the comparative purposes to assess robustness between the regression models is adequate and, moreover, serves to reduce the focus of this review to a compact set of specifications.

Dominica Results

The removal of age in the earnings equation results in a larger constant value. However, all the estimated coefficients retain their expected signs. The estimated coefficients for tenure are slightly larger in magnitude for this model. For example, an individual with ten or more years of job tenure has earnings in this model that are about 6.9 percentage points more than in the originally specified IRM. This does suggest that the tenure variables are absorbing part of the variation attributable to the age variable from the original model. The results for education show no consistent pattern in the light of these specification changes. However, in this case the earnings for the primary educated cohort are statistically significant at the 10 percent level, with the primary educated earning, on average and *ceteris paribus*, 19.4 percent above the base group. In terms of the selection term, the result for the basic Mincerian equation has deteriorated. In addition to the selection effect being negative and thus counter-intuitive, it has also increased in magnitude compared to the case of the original IRM. Overall, the educational effects are not materially affected by this modification to the model, and

the estimated rates of return remain broadly in line with those reported in chapter five. Finally, the goodness of fit measure, the adjusted R^2, has contracted, in this model, with less of the variation in earnings now adequately explained by the set of included explanatory variables. This highlights the importance of the age variables to the earnings determination process.

Table 9.4. Dominica: Interval Regression Model Estimates for Log Monthly Earnings without Age Variable

Variables	Basic Mincerian
Constant	4.1999***
	(0.2513)
Male	0.1573***
	(0.0511)
Carib	-0.5155***
	(0.1198)
Primary	0.1771*
	(0.0969)
Secondary Incomplete	0.4116***
	(0.1496)
Secondary	0.6694***
	(0.1048)
Tertiary	0.9337***
	(0.1077)
Other Education	0.7386**
	(0.5196)
University	1.1923***
	(0.1421)
Tenure_2	-0.0304
	(0.0949)
Tenure_3	0.0652
	(0.0691)
Tenure_4	0.3002***
	(0.0710)
Tenure_5	0.2719***
	(0.0701)
Log(Hours)	0.5469***
	(0.0593)
Government	†
Self-employed	†
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.2258***
	(0.0859)
Industry Controls	No
District Controls	No
Adjusted-R^2	0.3755
McFadden R^2	0.0954
Pseudo Log-Likelihood	-2418.4
σ	0.6399
Sample Size	1138

Notes:
(a) The estimated standard errors reported in parentheses are based on Huber (1967).
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) † denotes not applicable in estimation.

Although the results from the augmented (1) and augmented (2) are not provided here, as a complement to the results in table 5.2 a brief discussion follows on these comparative results. The estimated selection effects in the adjusted model remain negative but are not now all well determined. However, there is not a great deal of confidence that the age variable provides an adequate identifying instrument in the current context as it is already known from earlier chapters that it influences the earnings variable in all cases. In the case of Dominica, on the basis of Wald tests the separation by gender of the basic Mincerian is not supported and hence gender estimates are unable to be compared. In table 9.4 the re-estimated IRM estimates for Dominica are provided.

St.Lucia Results

The goodness of fit measures in the adjusted interval regression model are lower as compared to the original model. Again, this is not surprising as the specification excludes what we regard as a highly relevant variable. The estimated coefficients retain the correct signs, and are in line with the original regression model results reported in the earlier chapter six. For example, in the case of education, the estimated coefficients in the adjusted IRM are only slightly different from those reported in chapter six thus ensuring no material difference to the rate of returns estimates. In the case of the tenure effects the differences in the coefficients between the two models, register at their widest difference a 9 percentage point gap. It is in the estimated selection term that provides the greatest divergence with differences registered in both the signs and the size of the estimated coefficient. Overall, the goodness of fit measure for the original IRM is superior to the adjusted or re-specified IRM. The exclusion of the age variables does not appear empirically sensible. In fact, the empirical literature for many developing countries that utilize earnings equation reveal no studies where the earnings equation excluded age and its square.

Table 9.5. St. Lucia: Interval Regression Model Estimates for Basic Mincerian Log Monthly Earnings Specifications without Age Variable

Variables	1996			2004		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	3.8812***	3.8956***	4.1775***	4.6120***	4.7340***	4.5236***
	(0.2458)	(0.3002)	(0.3715)	(0.3101)	(0.4441)	(0.4302)
Male	0.3738***	†	†	0.1744***	†	†
	(0.0332)			(0.0352)		
Primary	0.0847*	0.0565	0.1665**	0.2244***	0.2834***	0.1012
	(0.0439)	(0.0566)	(0.0697)	(0.0635)	(0.0733)	(0.1301)
Secondary	0.5273***	0.3996***	0.7051***	0.5404***	0.5828***	0.4879***
	(0.0518)	(0.0707)	(0.0777)	(0.0685)	(0.0835)	(0.1382)
Incomplete	0.2283**	0.1575	0.2685*	0.3867***	0.4162***	0.2761
Secondary	(0.0981)	(0.1352)	(0.1398)	(0.1062)	(0.1373)	(0.1690)
Tertiary	0.9704***	0.8156***	1.1714***	0.9217***	0.7689***	1.0385***
	(0.0741)	(0.1244)	(0.0939)	(0.0775)	(0.0966)	(0.1583)
Other	0.6948***	0.8543***	0.5126	0.4150***	0.5977**	0.1793
	(0.1743)	(0.1332)	(0.3169)	(0.1529)	(0.2646)	(0.1535)
University	1.3528***	1.1783***	1.6873***	1.2421***	1.2852***	1.2754***
	(0.0749)	(0.0928)	(0.1152)	(0.0973)	(0.1250)	(0.1899)
Tenure_2	-0.0004	-0.0226	0.1073	0.0884	0.0770	0.1378
	(0.0882)	(0.1096)	(0.1390)	(0.0946)	(0.1368)	(0.1267)
Tenure_3	0.2175***	0.1805***	0.3348***	0.1240*	0.0149	0.2761***
	(0.0612)	(0.0733)	(0.0981)	(0.0752)	(0.1071)	(0.0966)
Tenure_4	0.3513***	0.2855***	0.4998***	0.3433***	0.1961*	0.5221***
	(0.0633)	(0.0769)	(0.1026)	(0.0787)	(0.1105)	(0.1019)
Tenure_5	0.5812***	0.5325***	0.6954***	0.4249***	0.2823***	0.6155***
	(0.0629)	(0.0766)	(0.1017)	(0.0784)	(0.1082)	(0.1060)
Log(Hours)	0.5703***	0.7029***	0.3818***	0.4811***	0.5345***	0.4255***
	(0.0621)	(0.0775)	(0.0937)	(0.0777)	(0.1163)	(0.0955)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection	0.0480	-0.0536	0.2806***	-0.2263***	-0.3306***	-0.0176
	(0.0594)	(0.0837)	(0.0850)	(0.0665)	(0.0870)	(0.1190)
Term)						
Survey Round Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.3359	0.3127	0.3897	0.3480	0.3212	0.4074
McFadden R^2	0.1125	0.5110	0.6071	0.1177	0.5136	0.6102
Pseudo Log-Likelihood	-3171.2	-1747.3	-1404.1	-2039.9	-1124.5	-901.3
σ	0.6054	0.6159	0.5804	0.5591	0.5705	0.5330
Sample Size	2094	1112	982	1362	730	632

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

Barbados Results

The adjusted IRM results for Barbados broadly follow the same pattern as with Dominica and St.Lucia. The tenure coefficients are larger here; however, the coefficients on education are not all that different. The coefficient on gender in both years is lower in the adjusted IRM as also is the case in Dominica and St.Lucia. In addition, the selection term maintains the same sign. The adjusted R^2 s are also lower in this altered specification. The results for the augmented earnings equation using the

adjusted IRM specification mirror the same patterns as reported here for the basic Mincerian equation.

Table 9.6. Barbados: Interval Regression Model Estimates for Basic Mincerian Log Monthly Earnings Specifications without Age Variable

Variables	1999			2003		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	4.9554***	4.9331***	4.8896***	3.5893***	4.0194***	3.1114***
	(0.0731)	(0.1264)	(0.0961)	(0.1323)	(0.1716)	(0.2031)
Male	0.0523***	†	†	0.1221***	†	†
	(0.0122)			(0.0106)		
Secondary	0.1221***	0.0866***	0.2014***	0.1323***	0.1080***	0.2045***
	(0.0129)	(0.0176)	(0.0180)	(0.0126)	(0.0152)	(0.0232)
Technical vocational	0.1589***	0.1046***	0.2938***	0.2388***	0.1687***	0.3748***
	(0.0271)	(0.0339)	(0.0447)	(0.0228)	(0.0261)	(0.0451)
University	0.5343***	0.4575***	0.6734***	0.7096***	0.6327***	0.8509***
	(0.0186)	(0.0252)	(0.0269)	(0.0171)	(0.0230)	(0.0287)
Other	0.3987***	0.3802***	0.5006***	0.1190	0.1283	0.1483
	(0.0782)	(0.1230)	(0.1068)	(0.0815)	(0.0919)	(0.01548)
Tenure_2	0.0678***	0.0880***	0.0505**	0.1519***	0.1427***	0.1572***
	(0.0164)	(0.0246)	(0.0221)	(0.0170)	(0.0238)	(0.0242)
Tenure_3	0.1537***	0.1563***	0.1614***	0.2299***	0.2143***	0.2380***
	(0.0188)	(0.0276)	(0.0260)	(0.0185)	(0.0259)	(0.0264)
Tenure_4	0.2128***	0.2026***	0.2358***	0.2860***	0.2694***	0.2933***
	(0.0214)	(0.0301)	(0.0311)	(0.0211)	(0.0297)	(0.0300)
Tenure_5	0.2270***	0.2117***	0.2503***	0.3398***	0.2929***	0.3878***
	(0.0220)	(0.0312)	(0.0323)	(0.0240)	(0.0319)	(0.0373)
Tenure_6	0.2906***	0.2741***	0.3125***	0.3993***	0.3394***	0.4579***
	(0.0217)	(0.0314)	(0.0307)	(0.0212)	(0.0301)	(0.0303)
Log(Hours)	0.2212***	0.2662***	0.1822***	0.5676***	0.5194***	0.6301***
	(0.0178)	(0.0319)	(0.0207)	(0.0350)	(0.0457)	(0.0533)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.3259***	-0.4993***	-0.0945*	-0.4569***	-0.6547***	-0.1806***
	(0.0382)	(0.0593)	(0.0526)	(0.0339)	(0.0465)	(0.0536)
Adjusted-R^2	0.2758	0.2430	0.3218	0.4522	0.5095	0.3944
McFadden R^2	0.0772	0.4921	0.5872	0.1368	0.5474	0.5925
Pseudo Log-Likelihood	-13026.1	-7170.1	-5827.9	-15535.8	-8146.7	-7335.1
Sigma (σ)	0.3864	0.3951	0.3739	0.3984	0.3770	0.4189
Sample Size	7478	3971	3507	8603	4454	4149

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

In summary, the exclusion of age in the earnings regression, as is the case in the adjusted IRM, appears to induce a mis-specification in the regression model. Although the tenure effects increase in magnitude, little else is found to change in the various specifications. The age variable and its quadratic are primarily included to capture the effects of general labour force experience, while the tenure effects reflect the effect of job-specific human capital. These are distinct concepts and thus justify separate treatment and inclusion in earnings equations of the type estimated here. In addition, the continuous age variable has been included in the selection equations and does not add a

great deal to the analysis as it demonstrably cannot play the role of a selection effect identifier.

The lack of age and its quadratic in the earnings equation restricts key information from being derived. The use of the linear and quadratic estimates on age is useful to draw some inferences about the life-cycle turning points at which earnings are maximized. Being familiar with the Caribbean labour markets earnings are indeed maximised later in life and this is similarly the case in other developing countries. For example in the case of Djibouti, the average age of the population is 37.8 years (See Anos-Casero and Seshan 2006) and earnings is maximised at 42.3 years.

The Ordinary Least Square Model with Interval Mid-Points

The OLS model is estimated with identical explanatory variables as in the original IRM, but the dependent variable is now the logarithm of the midpoint earnings levels within the relevant intervals. The OLS model also utilises the same form of the probit selection model to derive the selection term used as was the case in the original interval earnings regression models (i.e., the age dummies now proxy for life cycle effects in participation rather than the continuous age variable as used earlier in this chapter). The OLS results are now discussed for the basic Mincerian specification for the respective countries

Dominica Results

The OLS results closely mirror the results for the original IRM. The constant term in the OLS is less than one percentage points lower in the basic Mincerian specification. The earnings rewards to males using the basic Mincerian are lower here by about 0.8 percentage points thus rendering the differences between the two specifications close to negligible. The results for the education coefficients yield slightly larger coefficients for the OLS case except for the primary category, for which the coefficient is indistinguishable from zero. However, the estimated rates of return for the different educational categories are largely unaltered by the use of OLS here.

Table 9.7. Dominica: Ordinary Least Squares Model Estimates for Basic Mincerian Log Monthly Earnings

Variables	Basic Mincerian
Constant	2.8709***
	(0.2513)
Age	0.0665***
	(0.0133)
Age squared	-0.0008***
	(0.0002)
Male	0.2293***
	(0.0529)
Carib	-0.4568***
	(0.1267)
Primary	0.1109
	(0.1083)
Secondary Incomplete	0.4664***
	(0.1525)
Secondary	0.6325***
	(0.1154)
Tertiary	0.9365***
	(0.1195)
Other Education	0.6632
	(0.4256)
University	1.0892***
	(0.1430)
Tenure_2	-0.0680
	(0.1001)
Tenure_3	0.0446
	(0.0699)
Tenure_4	0.2372***
	(0.0734)
Tenure_5	0.2028***
	(0.0742)
Log(Hours)	0.5573***
	(0.0618)
Government	†
Self-employed	†
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.0761***
	(0.0834)
Industry Controls	No
District Controls	No
Adjusted-R^2	0.3761
Sample Size	1138

Notes:
(a) The estimated standard errors reported in parentheses are based on Huber (1967).
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) † denotes not applicable in estimation

In general the differences in results are minor. Given the evidence in the empirical literature and the reservations associated with the use of OLS when the data on the dependent variable are interval coded, the IRM is taken to provide a better basis for inference for the purposes of this study. Thus, a simple 'eyeballing' of the results which is the best that can be done to conduct a comparative analysis does not provide evidence of great differences between the two approaches. However, given the well documented limitations associated with OLS when the dependent variable is interval codes, the IRM

remains our preferred model. The results of the earnings equation estimated by OLS for Dominica are contained in table 9.7.

St.Lucia Results

In the case of St.Lucia the constant term in the OLS specification for the basic Mincerian is higher in almost all instances except for females in 1996 and males in 2004. Despite being higher the percentage difference between the two specifications is small, averaging less than 2 percentage points. The coefficients take the expected signs and the coefficients on tenure are higher in the OLS case for those coefficients with statistically significant results, namely for tenure_2 in all years and all groups and in some cases for tenure_3. In both years the coefficients for male is slightly lower in the OLS, however in 2003 the difference in the value of the coefficients for the two models is considerably smaller. The selection term in both models take the same signs and retain the statistical significance.

The education coefficients between the OLS and IRM reveal no material difference. Overall, the differences in the coefficients between the two procedures are negligible. The OLS estimates for St.Lucia for the basic Mincerian are available in table 9.8.

Table 9.8. St. Lucia Ordinary Least Squares Model Estimates for Basic Mincerian Log Monthly Earnings Specifications

Variables	1996			2004		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	2.6030***	2.6477***	2.4313***	3.8861***	4.0729***	3.6946***
	(0.2903)	(0.3711)	(0.4490)	(0.4602)	(0.6215)	(0.6641)
Age	0.0642***	0.0634***	0.0926***	0.0269**	0.0186	0.0444**
	(0.0001)	(0.0134)	(0.0166)	(0.0131)	(0.0177)	(0.0204)
Age^2	-0.0007***	-0.0007***	-0.0011***	-0.0003*	-0.0002	-0.0005*
	(0.0001)	(0.0002)	(0.0002)	(0.0002)	(0.0002)	(0.0003)
Male	0.4238***	†	†	0.2132***	†	†
	(0.0343)			(0.0379)		
Primary	0.1320***	0.0929	0.2029***	0.2502***	0.2970***	0.1241
	(0.1320)	(0.0609)	(0.0731)	(0.0676)	(0.0802)	(0.1341)
Secondary Incomplete	0.3159***	0.1823	0.4074***	0.3715***	0.3238**	0.3476*
	(0.0950)	(0.1368)	(0.1303)	(0.1124)	(0.1520)	(0.1793)
Secondary	0.6516***	0.4800***	0.8510***	0.6231***	0.6264***	0.5821***
	(0.0571)	(0.0772)	(0.0852)	(0.0785)	(0.1004)	(0.1452)
Tertiary	1.0943***	0.8403***	1.3404***	1.0536***	0.8443***	1.1759***
	(0.0745)	(0.1201)	(0.0960)	(0.0891)	(0.1163)	(0.1595)
Other	0.7675***	0.8565***	0.6044*	0.4291***	0.5677*	0.2486
	(0.1724)	(0.1230)	(0.3211)	(0.1659)	(0.2920)	(0.1682)
University	1.3444***	1.1632***	1.6528***	1.3323***	1.3224***	1.3654***
	(0.0728)	(0.0919)	(0.1098)	(0.0979)	(0.1237)	(0.1786)
Tenure_2	0.0500	0.0247	0.1434	0.0956	0.1123	0.0949
	(0.0907)	(0.1080)	(0.1482)	(0.0940)	(0.1377)	(0.1273)
Tenure_3	0.2313***	0.1937***	0.3331***	0.1110	0.0454	0.1971**
	(0.0621)	(0.0756)	(0.0978)	(0.0753)	(0.1092)	(0.0987)
Tenure_4	0.2826***	0.2293***	0.4012***	0.3027***	0.2065*	0.4160***
	(0.0649)	(0.0795)	(0.1044)	(0.0796)	(0.1123)	(0.1065)
Tenure_5	0.4329***	0.3985***	0.5216***	0.3761***	0.3052***	0.4704***
	(0.0670)	(0.0824)	(0.1064)	(0.0797)	(0.1094)	(0.1137)
Log(Hours)	0.5448***	0.6731***	0.3765***	0.4894***	0.5684***	0.4098***
	(0.0590)	(0.0777)	(0.0885)	(0.0844)	(0.1246)	(0.1014)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	0.1443**	0.1677*	0.2893***	-0.1081	-0.1679*	0.0327
	(0.0603)	(0.0916)	(0.0860)	(0.0701)	(0.0979)	(0.1132)
Survey Round Controls	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted-R^2	0.3419	0.2787	0.3599	0.3397	0.2791	0.4132
Sample Size	2094	1112	982	1362	730	632

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

Barbados Results

The coefficients on the constant term are higher in the OLS in 2004 as compared to the original IRM. In 1999, the coefficient on male is slightly lower in the OLS than for the comparative IRM, however over the latter period a difference of about 2.5 percentage points is observed. In general the coefficients yield the correct signs and the significant levels have been retained throughout. Overall, the differences between the coefficients

estimated using the original IRM and the OLS are again negligible for this country. The OLS results for the basic Mincerian in respect of Barbados are presented in table 9.9.

Table 9.9. Barbados Ordinary Least Squares Model Estimates for Basic Mincerian Log Monthly Earnings Specifications

Variables	1999			2003		
	All	**Male**	**Female**	**All**	**Male**	**Female**
Constant	4.2905***	4.1981***	4.1630***	2.8161***	3.1812***	2.2807***
	(0.1050)	(0.1608)	(0.1385)	(0.1518)	(0.2010)	(0.2202)
Age	0.0228***	0.0263***	0.0304***	0.0118***	0.0114*	0.0255***
	(0.0037)	(0.0054)	(0.0052)	(0.0047)	(0.0061)	(0.0073)
Age^2	-0.0002***	-0.0002***	-0.0003***	-0.0001*	-0.0001	-0.0005***
	(0.0000)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Male	0.1196***	†	†	0.1906***	†	†
	(0.0108)			(0.0120)		
Secondary	0.1917***	0.1611***	0.2594***	0.1929***	0.1852***	0.2289***
	(0.0125)	(0.0165)	(0.0190)	(0.0155)	(0.0185)	(0.0272)
Technical vocational	0.2526***	0.1936***	0.3934***	0.3286***	0.3025***	0.4116***
	(0.0262)	(0.0322)	(0.0447)	(0.0268)	(0.0305)	(0.0543)
University	0.6211***	0.5334***	0.7528***	0.8053***	0.7118***	0.9175***
	(0.0167)	(0.0225)	(0.0251)	(0.0196)	(0.0249)	(0.0334)
Other	0.4246***	0.3104***	0.5500***	0.0410	0.0284	0.0408
	(0.0808)	(0.1210)	(0.1077)	(0.0993)	(0.1128)	(0.1851)
Tenure_2	0.0337**	0.0370	0.0278	0.1382***	0.1411***	0.1359***
	(0.0154)	(0.0236)	(0.0204)	(0.0199)	(0.0280)	(0.0280)
Tenure_3	0.0873***	0.0688***	0.1052***	0.2069***	0.2046***	0.2018***
	(0.0184)	(0.0277)	(0.0248)	(0.0219)	(0.0306)	(0.0311)
Tenure_4	0.1364***	0.1061***	0.1625***	0.2680***	0.2622***	0.2635***
	(0.0211)	(0.0306)	(0.0299)	(0.0247)	(0.0344)	(0.0353)
Tenure_5	0.1466***	0.1144***	0.1671***	0.3269***	0.2953***	0.3558***
	(0.0221)	(0.0316)	(0.0318)	(0.0276)	(0.0366)	(0.0425)
Tenure_6	0.2173***	0.1838***	0.2316***	0.4120***	0.3641***	0.4535***
	(0.0220)	(0.0320)	(0.0307)	(0.0253)	(0.0351)	(0.0366)
Log(Hours)	0.2141***	0.2617***	0.1760***	0.6388***	0.5909***	0.6919***
	(0.0165)	(0.0295)	(0.0195)	(0.00302)	(0.0427)	(0.0400)
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	-0.0500*	-0.0812*	0.0841**	-0.2578***	-0.2606***	-0.1435***
	(0.0280)	(0.0417)	(0.0391)	(0.0353)	(0.0460)	(0.0558)
Adjusted-R^2	0.2825	0.2376	0.3158	0.4250	0.3929	0.4258
Sample Size	7478	3971	3507	8603	4454	4149

Notes:
(a) The numbers in parentheses are based on the Huber (1967) adjustment.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(c) †denotes not applicable in estimation

Discussions on Rates of Return, Gender Pay Gap and Public Sector Pay Premium

To further assess the robustness of the original specification, the findings for the rates of return to education, gender pay gap and public sector pay premium derived from the re-estimated IRM and the OLS model are compared to the original IRM. The calculations of the rate of return to education in both the re-estimated IRM and the OLS gives numerical differences in the rates of return as should be expected, however the

computed estimates are in most cases less than one standard error from those obtained in the original IRM. The rates of return to education derived from the re-estimated IRM are presented in A.9.1 to A.9.2 as an illustration of the small differences in the estimates between the original and re-estimated IRM. Similarly, the gender pay gaps are compared across the different models and again the coefficients vary, but the estimates are again comparable to those obtained for the original earnings model in chapters five to seven. The percentage point differences for the gender pay gap using the basic Mincerian specification as compared to the original IRM are again fairly modest and are generally of the order of less than one percentage point except for the case of Barbados in 2003. The percentage point differences on the gender pay gap between the re-estimated IRM and the original model for this country range between three to eight percentage points. In all cases, however, any statistically insignificant effects obtained in the original models are also obtained in the re-estimated models.

The public sector pay premium is compared across the three specifications and again while the numerical value of the premium has changed the standard errors are less than one standard deviation. The public sector pay premium derived by OLS is less than one percentage point different from those estimated from the original model, except in the case of Barbados 2003. Meanwhile, the public sector pay premium derived from the re-estimated IRM gives a wider margin of about 3 percentage points. The coefficients for the gender and public sector utilizing the re-estimated IRM and OLS are provided in table A.9.3.

Conclusions

The re-specified probit selection equation, now estimated with the exclusion of age and its quadratic from the earnings equation, has not resulted in noticeable improvements in identifying the estimated selection term. The use of age as an identifier does not appear entirely plausible given its observed statistical significance in the earnings equation model. This again highlights the lack of good instruments available in the LFS of the countries reviewed here. Data limitations prevent a more rigorous investigation of the participation selection issue. This confirms a limitation of the current thesis but one that

cannot be resolved given the nature of data available for the Caribbean islands in question.

The use of OLS in conjunction with the mid-points of the earnings variable does not appear to yield any material difference in results though the limited nature of the variation in the dependent reduces the goodness-of-fits for these regression models. The interval regression models thus could be taken to provide a reasonably adequate modelling approach for the current set of applications. Given that the dependent variables are defined differently between the OLS-based approach and the ML-based approach, it is not feasible to make a direct or definitive judgment about which of these models is superior using standard goodness-of-fit diagnostics like R^2 values. In addition, given the data used for both estimation techniques are the same (i.e., drawn from a common sample), t-tests of differences in estimated effects are invalid. Thus, the comparisons offered in the text above are based primarily on simply 'eye-balling' the estimates. However, little material difference is noted across the different estimation techniques using such an 'eye-balling' approach. Given the noted limitations in chapter four associated with the use of OLS when the earnings data on the dependent variable are interval-coded, the preferred inferences offered in this thesis for policy purposes are based on the set of interval regression models.

Finally, specifying the earnings equation without age in all likelihood introduces a mis-specification into the regression model. The age variable (and its quadratic) is primarily included to capture the effects of more general labour force experience, while the tenure effects reflect the effect of job-specific human capital. These are distinct concepts and thus justify separate inclusion in earnings equations of the type estimated here.

CHAPTER 10: CONCLUSIONS AND SUMMARY OF FINDINGS

The research and analysis on the rates of return to education, inter-industry wage structure, public-private sector pay premium and gender pay gap fills a void in the literature on these themes for the Eastern Caribbean countries of Dominica, St. Lucia and Barbados. The empirical literature on the above themes is copious for developed countries and for some developing countries in Africa, Latin America and Asia but for the Caribbean, and in particular the smaller islands of the Eastern Caribbean, the literature is limited. The fact that research in these areas has not been undertaken for the Eastern Caribbean provides a key motivation for the research undertaken in this thesis. The empirical findings in this study have been insightful and allowed their setting within both the Caribbean and the broader international literature.

The Mincerian earnings equation has proved a very robust empirical model for market-based economies across both time and space, and is legitimately viewed as a success story of modern empirical labour economics. The successful application of this empirical framework to the small island labour markets of Dominica, Barbados and St.Lucia confirms its durability and versatility. The augmented version of this empirical model was found to explain the greater part of the variation in main job earnings and provided an array of important policy-related insights.

The research finds that the observed outcomes in the empirical literature on the selected themes in this thesis are in most cases comparable for Dominica, St. Lucia and Barbados. In terms of returns to education, the empirical evidence posits rates of returns to education that are highest at the primary level. However, in this research the estimated returns conflict with the literature (see Psacharopoulos and Patrinos (2004)). In all selected countries the returns to education were in most cases, and for both gender groups, highest at the university level. In the Eastern Caribbean individuals acquire on average more years of schooling than is the case in Latin America and Africa, and this may explain why the outcomes with respect to returns are different from the conventional patterns observed for developing countries. In the study, the rates of

return increase progressively with educational attainment with the lowest returns for primary education. In fact, the pattern of increasing rates of return with educational level is generally observed in the returns to educational investment in the more advanced economies of the world (see for example, Machin and Stevens 2004).

Another pattern that is fairly prominent in the empirical literature on the returns to education is higher rates of return in developing countries compared to developed countries. In the case of Dominica, St. Lucia and Barbados the results for the returns to education follow this pattern. Furthermore, in the empirical literature there is evidence that as per capita income of a country increases the returns to education decline (see Psacharopoulos et al. 2004). If this holds true then it may explain the observed lower returns for post-secondary education for Barbados compared to Dominica and St. Lucia. The per capita income in Barbados, using the United Nations Development Programme (UNDP) classification for the Human Development Index (HDI), has consistently placed Barbados in the 'very high human development' category while Dominica and St. Lucia rank as 'high human development'. Although all three countries have similar educational indicators, adult literacy and life expectancy indices, the area in which they differ is in their per capita income levels.[1]

The estimates on the rates of return to education in this study clearly indicate that investment in post-secondary education is a profitable investment in the Eastern Caribbean as these qualifications are amply rewarded in the labour market. The research conducted in this thesis situates the rates for the three Eastern Caribbean countries between the spectrum of developed and other developing countries. The conventional wisdom is that the returns to education in developing countries are much higher than the rest of the world. As higher wages are paid for scarce skills, and because educated labour is scarce in developing countries, then the returns to education must be high.

The onus therefore rests on private individuals to take greater initiative to invest in their own education or the government, through scholarship or loan programmes, to expand the opportunities to university education to suitably qualified individuals. At the core of the challenges affecting Caribbean labour markets are skills mismatch, low productivity and high unemployment and these have bearings on the available pool of human capital.

An extensive literature on the benefits of education to economic development exists and regional Governments should view investment in human capital as a means of furthering economic development of the relevant country. Our empirical estimates confirm that human capital raises productivity, as measured by wages. The need exists to allocate educational spending more effectively especially since fiscal constraints facing governments in developing countries affect their ability to fully overhaul the educational systems and subsidize students to pursue post-secondary education. The recommendation is not to expand education spending, as already spending on education in the region is high, but rather to reduce costs and apportion the resources more efficiently so as to reap greater rewards.

In the context of the inter-industry wage structure, the thesis adds to the existing empirical literature as the majority of studies that have examined the inter-industry wage structure are for countries within the Organisation for Economic Cooperation and Development (OECD) area. The inter-industry wage structure reflects key aspects of the earnings determination process in the Caribbean. The fall-out of the region from the contraction in the agriculture industry has been tremendous and this is manifested in the observed wage structures. In all the selected countries earnings in the 'agriculture' sector are well below the employment weighted average. This shows the pay penalty associated with employment in the agricultural sector following the loss of preferential EU market access for bananas (St. Lucia and Dominica) and sugar (Barbados). In the Eastern Caribbean, individuals in the 'finance' and 'transport' industries, in contrast, receive a sizeable earnings premia and these are in keeping with the transition of these island economies to a more services-based economy.

The earnings in the public sector in the selected countries vary; in general, there is an overall public sector pay premium for employees in Dominica and Barbados. Once disaggregated by gender, males receive a pay premium in Dominica and St.Lucia in the 1990s and in Barbados in 2003. In St. Lucia in 1999, while males receive a pay premium, the earnings of publically employed females are statistically indistinguishable from those in the private sector. However, by 2004 the outcomes are completely reversed with females rather than males receiving a sizeable public sector pay premium. In Barbados in both time periods, women are the big winners in the public sector, with a sizeable increase in the earnings in the latter period. The existence of high public sector

pay premium clearly points to a greater role for the private sector to generate employment that is attractive to the more skilled labour market participants. In addition to the observed pay premia in the public sector, it is a well-known fact that public sector employees receive a host of non-pecuniary benefits (for example, study leave with pay, generous annual leave, union membership etc.). Thus, it is only expected that the security of tenure provided by attachment to the public sector will likely create queuing for public sector jobs by individuals with post-secondary education at the expense of the private sector. This in effect thwarts the effective functioning of the private sector labour market and renders it less efficient in allocating resources. In addition, it may also induce private sector firms to pay wages about the competitive rate to attract suitably qualified workers with implications for the private sector's competitive cost structure.

The governments are mindful of the importance of the private sector and this is reflected in their policies to encourage development of private businesses. The islands have in place measures to stimulate foreign direct investment such as the development of dedicated trade and investment promotion agencies and a full menu of investment incentives. In addition, the governments are aware of the importance of enterprise development as a means of reducing the high levels of unemployment especially among youth and women. A number of training programmes have been designed and these are complemented by initiatives geared to finance and provide advice on the development of small and medium sized enterprises as engines for self-employment. A more concerted effort by the governments or private investors to improve upon and provide the enabling infrastructure for private sector development is another important step in growing and encouraging the private sector to take up the risk of enterprise development. However, the public sector labour market, given its relative size in all three countries, has implications for the functioning of the private sector labour market and governments need to be aware of the dangers associated with public wage policies that starve the private sector of skilled and highly educated workers. However, it is clear from the empirical analysis that the wage determination process in the public sectors of these countries is in a state of flux and can be somewhat volatile across time. This simply reflects the effects of some of the public sector policy changes implemented in these Caribbean countries in recent years.

The existence of a male pay advantage is a feature of the earnings determination process in the Eastern Caribbean as it is in almost all market-based economies. Over time the male pay advantage in Dominica and St.Lucia has remained fairly stable. In contrast, the gap in Barbados has widened. The passage of equal pay legislation and its systematic application could help reduce gender pay discrimination and the unequal labour market treatment for women in all three labour markets.

Generally the countries of Dominica and St. Lucia have adopted a laissez-faire approach to the management of their labour markets. The national authorities need to rethink the policies on educational development, gender planning, and expand initiatives to boost the private sector. A more inclusive approach by the government to redress education policy and allow access for more individuals at the tertiary level is required. This expansion in educational access would not only reduce the scarcity in the supply of skills to the labour market but more importantly increase the pool of educated individuals to aid in economic development, also foster creativity and potentially engage in entrepreneurship thereby generating further employment. Of course, this may have implications for university returns but this may be a price worth paying if the policy stimulates economic growth and creates positive externalities. Private individuals must also be proactive and invest in the enhancement of their human capital, given the evidence that holders of post-secondary educational qualifications receive sizeable returns on their educational investment. Thus, greater government focus on education policy could have far-reaching positive externalities in the economic, labour markets and social spheres of the economy, through employment creation, greater tax revenue generation, reductions in poverty and enhanced human capital formation. In addition, there is an important role for the private sector in the Caribbean to be more entrepreneurial and foster innovation thus providing an impetus to encourage individuals to pursue further educations to exploit lucrative employment openings.

In summary, the empirical findings of this thesis identified rates of return to education to post-secondary education in St. Lucia and Dominica in the range of 15 to 24 percent. These rates of return are high and potentially point to a scarcity in the availability of skills in the labour market for tertiary and university educated individuals. The high rates of return and the prevalence of high unemployment points to a skills mismatch in

these labour markets. The rates of return to education in Barbados are lower than the rates in the other two countries, thus indicating a greater relative supply of educated workers in the Barbados labour market relative to demand. The availability of a better educated workforce in the case of Barbados translates into rates of return at the post-primary levels that are lower than in the other countries.

As the member states of the Caribbean Community (CARICOM) move closer to a single market and an integrated economy, the onus rests on national governments to pay greater attention to improving the human capital of the population so as to improve national competitiveness vis-à-vis the other countries in CARICOM. The finalisation of the CARICOM and European Union Economic Partnership Agreements (EPAs) has broadly liberalised trade in goods and services, improving the opportunities for reciprocity in trade in services. In order that CARICOM member states reap the full benefits of trade in services the scarcity in human capital skills as indicated by high rates of return already suggests a lack of educated labour to supply the national economy, with far less available to benefit under the EPAs.

In general, the findings in the thesis identify the need for more concerted efforts to expand access to post-secondary education. In the presence of high levels of emigration it is difficult to assign this responsibility on to the shoulders of national governments alone but nevertheless the definition of the policy framework and the creation of employment opportunities are important initiatives for the attention of the governments in the Eastern Caribbean. Further, the thesis has identified a greater role for the private sector in generating employment and attracting the post-secondary pool of skilled labour, thus minimising queuing by these individuals for employment in the public sector. Notwithstanding the presence of a pay disadvantage for women in Caribbean labour markets, it has to be acknowledged that the public sector has contributed in some way in narrowing this particular pay gap.

Limitations of Research

The limitations identified during the research undertaken in this thesis are as follows:

1. Given data constraints, it is not clear that adequate instruments have been found to identify selection employment or participation effects. However, the wage equation estimates generally reported are insensitive to the inclusion or exclusion of certain other identifiers used as revealed in chapter nine. Nevertheless, it is acknowledged that richer datasets with greater household-level demographic information are clearly necessary to investigate and hopefully resolve this difficult issue more effectively. This may be particularly relevant for the accurate computation of the gender pay gap.
2. In contrast to much of the existing literature, the inter-industry wage structure analysis has been restricted to just one-digit industry groups and not two-digit groups or even to a more disaggregated level. This is again mainly due to data constraints, since if two-digit industry groups were available and used, small cell sizes in each group would then become an issue given the overall small sample sizes generally available in the LFS for the Caribbean islands.
3. The conflation of self-employed with the wage employed is questionable. The remuneration for the former may include returns to physical capital if this is used by some of those engaged in the self-employment activity. So some caution is required in interpreting the self-employment earnings effects here. However, we believe that this issue is unlikely to be all that significant in the current context, though we acknowledge it as a potential limitation. If we did separate by such employment status, small cell sizes would again obviously emerge and the issue of occupational endogeneity would require a more explicit treatment raising anew issues around the appropriate identification of occupational selection effects.
4. The explicit treatment of the public/private dichotomy as exogenous is also debatable here. However, in order to address this issue, identifying instruments would again be required in conjunction with more sophisticated selection models. Such instruments are not readily available in the LFS data, as already noted above, and so this issue cannot be addressed empirically here. However, it does potentially represent a limitation of the current analysis in regard to findings around the public/private wage premium.

Agenda for Future Research

In undertaking the empirical analysis in this thesis, a number of areas for further research have been identified. First, to extend the analysis to other countries in the Caribbean, for example Jamaica, the Bahamas and Belize for which LFS data are available, but which were not initially accessible for this thesis. The extension of the analysis would serve to inform the presence or otherwise of a 'Caribbean pattern' based on an analysis of the themes of interest. Second, updating the analysis for the three countries using LFS data for later periods would capture the effects of recent labour market policy changes instituted at the national levels, as well as more global changes and other exogenous effects (e.g., the recent global financial crisis), and see how these have impacted upon the themes of interest. Third, the World Bank in conjunction with the Inter-American Development Bank are undertaking enterprise surveys in all CARICOM countries and it would be useful to incorporate a firm perspective to the analysis. The enterprise surveys would provide an opportunity to investigate for example, the remuneration practices of firms, hiring and firing decisions, and the demand for and the availability of skills in Caribbean countries.

ENDNOTES

[1] The most recent GDP per capita in purchasing power parity in the 2010 UNDP Human Development Report using 2007 data is highest for Barbados (US$17,956) followed by St. Lucia (US$9,786) and Dominica (US$7,893).

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APPENDIX

Chapter 2

Table A.2.1. Caribbean Studies Utilising Earnings Equations

Country	Year (Data)	Author
Barbados	1999	Griffith (2001)
Barbados	1994	Coppin (1996)
Trinidad and Tobago	1999	Bourne and Dass (2003)
Trinidad and Tobago	1993	Coppin and Olsen (1998,2001)
Suriname	1990-1993	Horowitz and Schenzler (1999)
Dominican Republic	1989	Psacharopoulos (1994)
Jamaica	1989	Psacharopoulos (1994)
Jamaica	1989	Scott (1992)
Puerto Rico	1989	Griffin and Cox Edwards (1993)
Bahamas	1970	Psacharopoulos (1994)
Puerto Rico	1959	Psacharopoulos (1994)

Source: Compiled from Psacharopoulos (1994) and a survey of the literature.

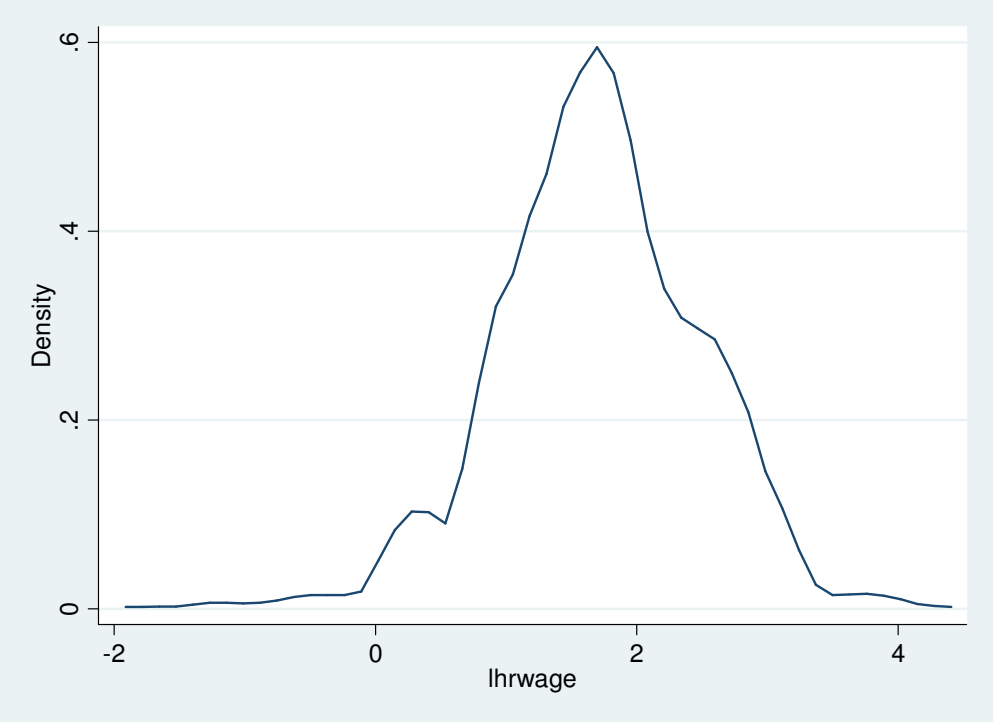
CHAPTER 3

Table A.3.1. Dominica Variable Description

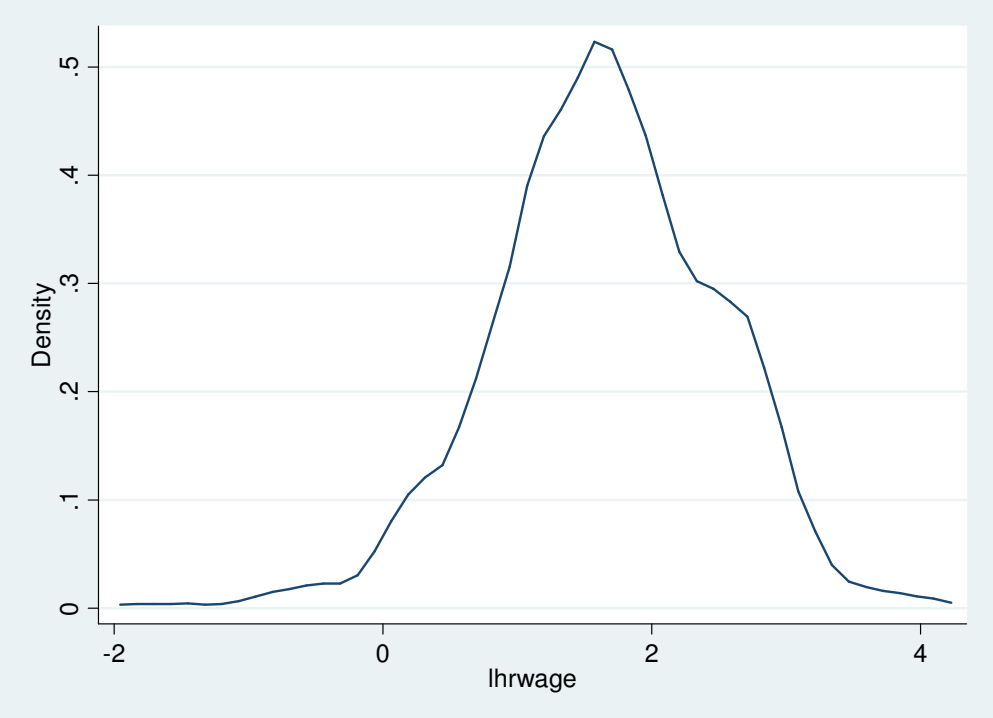
Variable	Description
HOH	=1 if the individual is head of household, =0 otherwise.
Age	Age measured in years.
Agedum_1§	=1 if individual age is <22, =0 otherwise
Agedum_2	=1 if individual age is ≥22 & <31, =0 otherwise.
Agedum_3	=1 if individual age is ≥31 & <41, =0 otherwise.
Agedum_4	=1 if individual age is ≥41 & <50, =0 otherwise.
Agedum_5	=1 if individual age is ≥50, =0 otherwise.
Male	=1 if individual is male, =0 otherwise.
Carib	=1 if individual is from the carib ethnic minority, =0 otherwise.
No Education§	=1 if individual has either no or incomplete primary education, =0 otherwise.
Primary	=1 if individual has completed primary education, =0 otherwise.
Secondary-Incomplete	=1 if individual has incomplete secondary education, =0 otherwise.
Secondary	=1 if individual has completed secondary education, =0 otherwise.
Other Education	=1 if individual has completed other education program, =0 otherwise.
Tertiary	=1 if individual has completed post-secondary education, =0 otherwise.
University	=1 if individual has completed university, =0 otherwise.
Tenure_1§	=1 if individual has job tenure less than 6 months, =0 otherwise.
Tenure_2	=1 if individual has job tenure of 6 months but less than 1 year, =0 otherwise.
Tenure_3	=1 if individual has job tenure of one year but less than 5 years, =0 otherwise.
Tenure_4	=1 if individual has job tenure of 5 years but less than 10 years, =0 otherwise.
Tenure_5	=1 if individual has job tenure of ten years or more, =0 otherwise.
Log(Hours)	Natural logarithm of actual weekly hours worked.
Private Sector§	=1 if individual is a private sector wage employee, =0 otherwise.
Government	=1 if individual is a government employee, =0 otherwise.
Self-employed	=1 if individual is self-employed, =0 otherwise
Agriculture§	=1 if industry is agriculture, fishing or forestry, =0 otherwise.
Manufacturing	=1 if industry is manufacturing, =0 otherwise.
Utility	=1 if industry is utility, =0 otherwise.
Construction	=1 if industry is construction, =0 otherwise.
Retail	=1 if industry is retail trades, =0 otherwise.
Hotels	=1 if industry is hotels, =0 otherwise.
Transport	=1 if industry is transportation, =0 otherwise.
Finance	=1 if industry is financial services, =0 otherwise.
Public Administration	=1 if industry is public administration, =0 otherwise.
Social Services	=1 if industry is social services, =0 otherwise.
Domestic Services	=1 if industry is domestic services, =0 otherwise.
Roseau City	=1 if individual resides in this district, =0 otherwise.
Roseau Rural§	=1 if individual resides in this district, =0 otherwise.
St. John	=1 if individual resides in this district, =0 otherwise.
St. Joseph	=1 if individual resides in this district, =0 otherwise.
St. Paul	=1 if individual resides in this district, =0 otherwise.
St. Luke	=1 if individual resides in this district, =0 otherwise.
St. Patrick	=1 if individual resides in this district, =0 otherwise.
St. David	=1 if individual resides in this district, =0 otherwise.
St. Andrew	=1 if individual resides in this district, =0 otherwise.
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Correction term)	The inverse Mills ratio (or selection correction) term where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the probability density and cumulative distribution function operators for the standard normal respectively.

Notes:
(a) § denotes the base group in regression model estimation.
(b) The 'Other Education' is comprised of basic skills training programs.
(c) 'Tertiary' education constitutes the level between secondary and university education. It comprises academic preparation for the advanced level examinations and certificate level technical skills training.
(d) The inverse Mills ratio term is constructed from the probit estimates reported in table A.5.4.

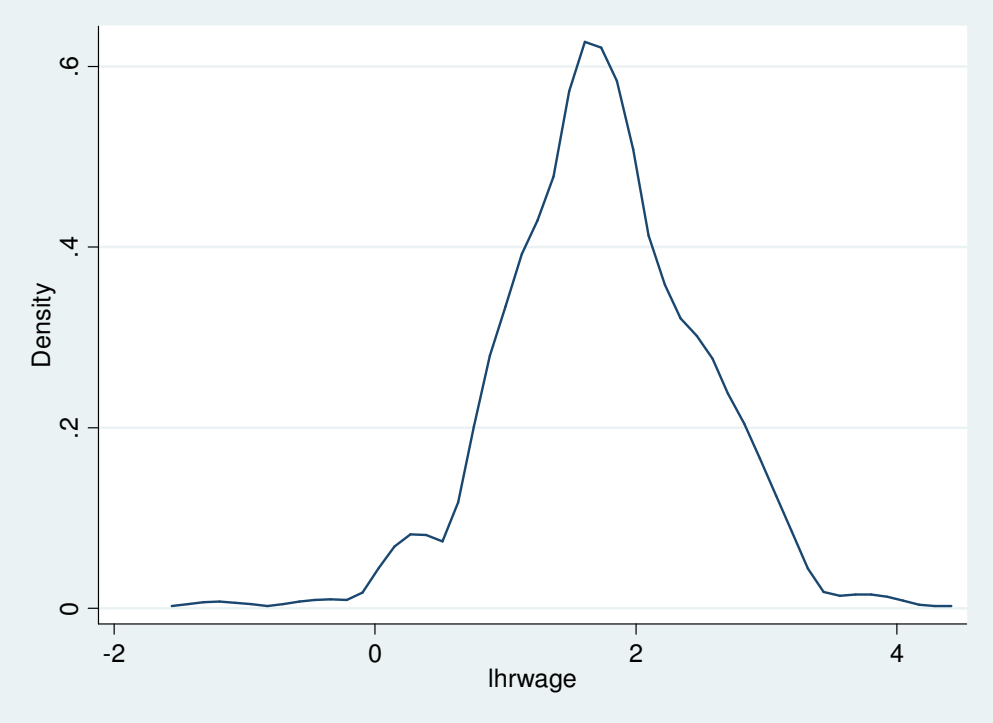
Graph A.3.1. Dominica ln(Hourly Wage) Employed Full Sample



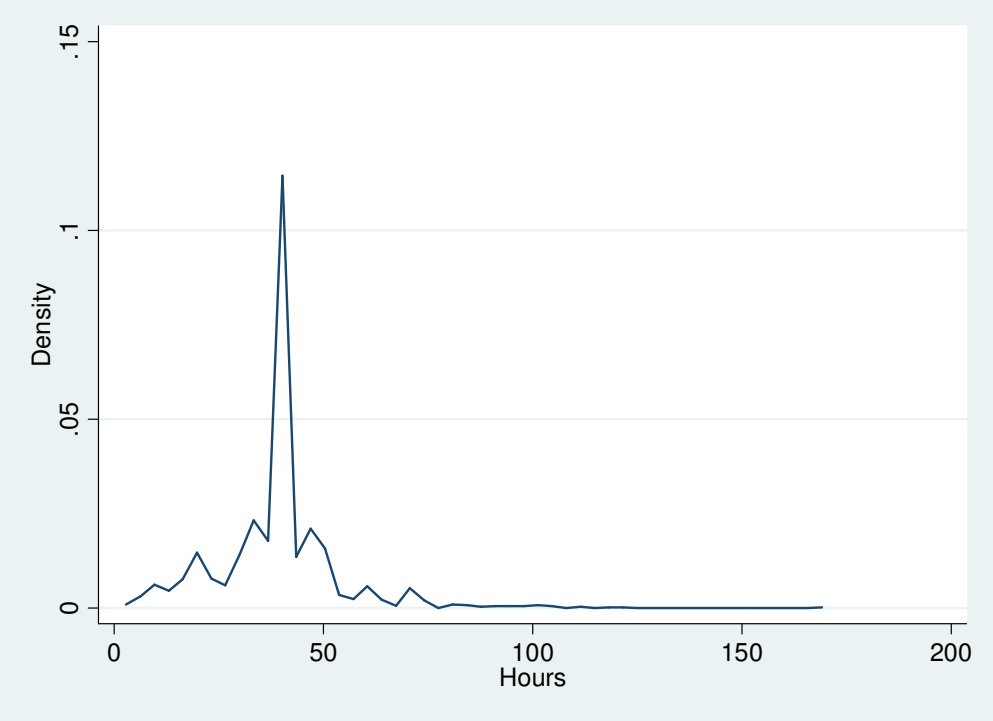
Graph A.3.2. Dominica ln(Hourly Wage) Employed Female



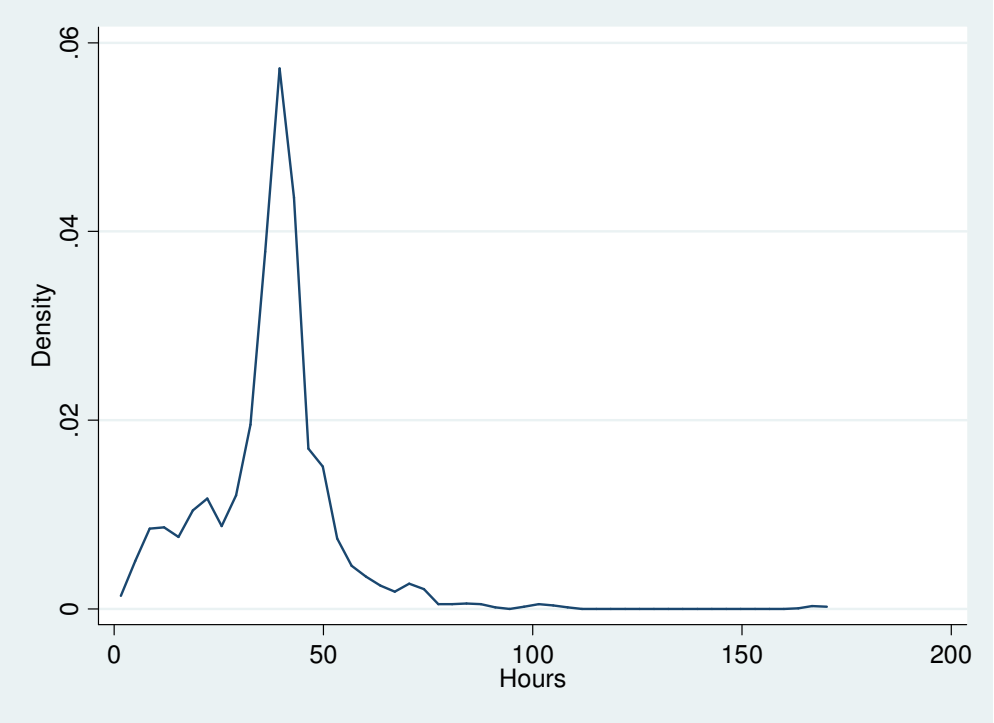
Graph A.3.3. Dominica ln(Hourly wage) employed male



Graph A.3.4. Dominica hours employed sample



Graph A.3.5. Dominica hours employed female sample



Graph A.3.6. Dominica hours employed male sample

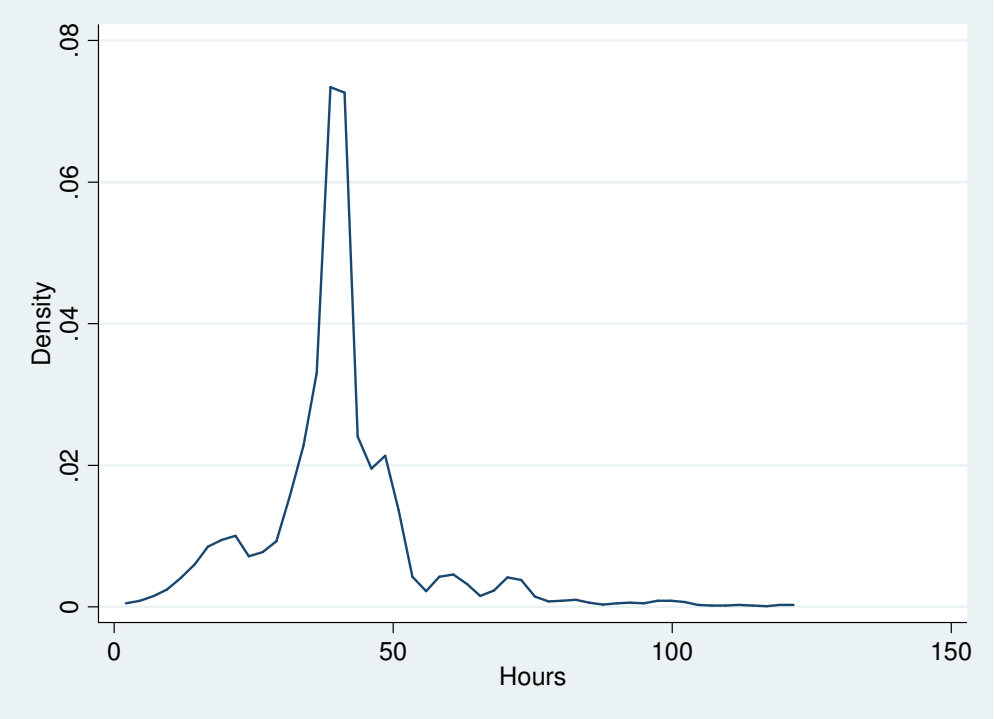


Table A.3.2. St. Lucia Variable Description

Variable	Description
Age	Age measured in years.
Male	=1 if individual is male, =0 otherwise.
No Education[§]	=1 if individual has no or incomplete primary education, =0 otherwise.
Primary	=1 if individual has completed primary education, =0 otherwise.
Secondary-Incomplete	=1 if individual has incomplete secondary education, =0 otherwise.
Secondary	=1 if individual has completed secondary education, =0 otherwise.
Other Education	=1 if individual has completed other education programme, =0 otherwise.
Tertiary	=1 if individual has completed post-secondary education, =0 otherwise.
University	=1 if individual has completed university, =0 otherwise.
Tenure_1[§]	=1 if individual has job tenure less than 6 months, =0 otherwise.
Tenure_2	=1 if individual has job tenure of 6 months but less than 1 year, =0 otherwise.
Tenure_3	=1 if individual has job tenure of one year but less than 5 years, =0 otherwise.
Tenure_4	=1 if individual has job tenure of 5 years but less than 10 years, =0 otherwise.
Tenure_5	=1 if individual has job tenure of ten years or more, =0 otherwise.
Log(Hours)	Natural logarithm of actual hours worked.
Private Sector[§]	=1 if individual is a private sector employee, =0 otherwise.
Government	=1 if individual is a government employee, =0 otherwise.
Self-employed	=1 if individual is self-employed, =0 otherwise
Agriculture	=1 if industry is agriculture, fishing or forestry, =0 otherwise.
Manufacturing[§]	=1 if industry is manufacturing, =0 otherwise.
Utility	=1 if industry is utility, =0 otherwise.
Construction	=1 if industry is construction, =0 otherwise.
Retail	=1 if industry is retail trades, =0 otherwise.
Hotels	=1 if industry is hotels, =0 otherwise.
Transport	=1 if industry is transportation, =0 otherwise.
Finance	=1 if industry is financial services, =0 otherwise.
Public Administration	=1 if industry is public administration, =0 otherwise.
Social Services	=1 if industry is social services, =0 otherwise.
Domestic Services	=1 if industry is domestic services, =0 otherwise.
Castries City	=1 if individual resides in this district, =0 otherwise.
Castries Rural[§]	=1 if individual resides in this district, =0 otherwise.
Anse LaRaye	=1 if individual resides in this district, =0 otherwise.
Soufriere	=1 if individual resides in this district, =0 otherwise.
Choiseul	=1 if individual resides in this district, =0 otherwise.
Labourie	=1 if individual resides in this district, =0 otherwise.
Vieux-Fort	=1 if individual resides in this district, =0 otherwise.
Micoud	=1 if individual resides in this district, =0 otherwise.
Dennery	=1 if individual resides in this district, =0 otherwise.
Gros Islet	=1 if individual resides in this district, =0 otherwise.
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	The inverse Mills ratio (or selection correction) term where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the probability density and cumulative distribution function operators for the standard normal respectively.

Notes:

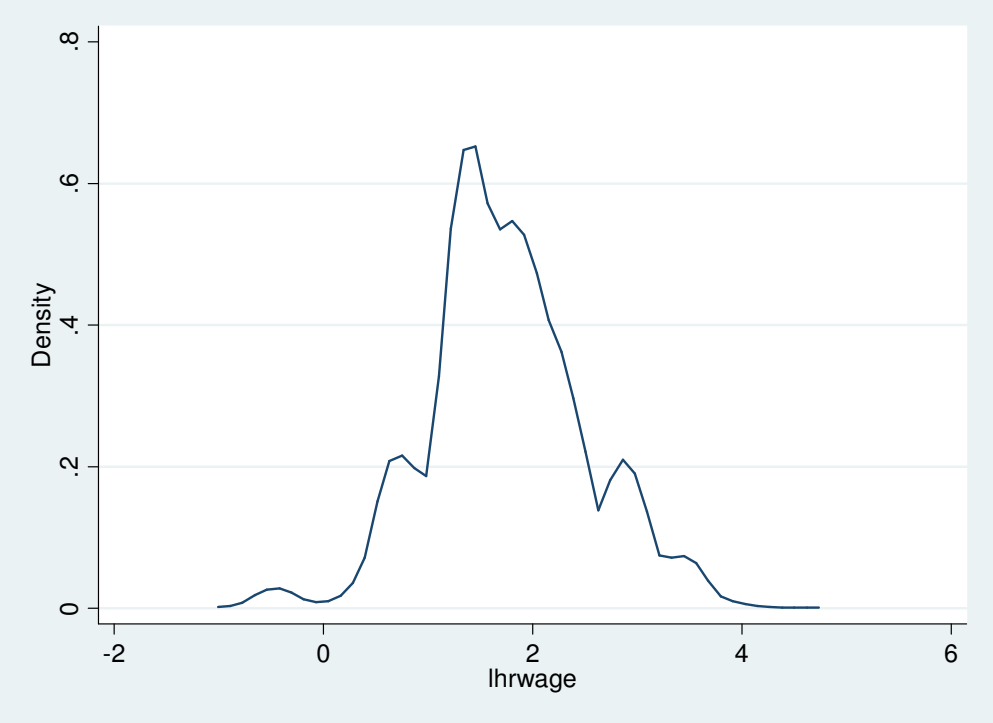
(a) The 'Other Education' is comprised of basic skills training programmes.

(b) 'Tertiary' education constitutes the level between secondary and university education. It comprises academic preparation for the advanced level examinations and certificate level technical skills training.

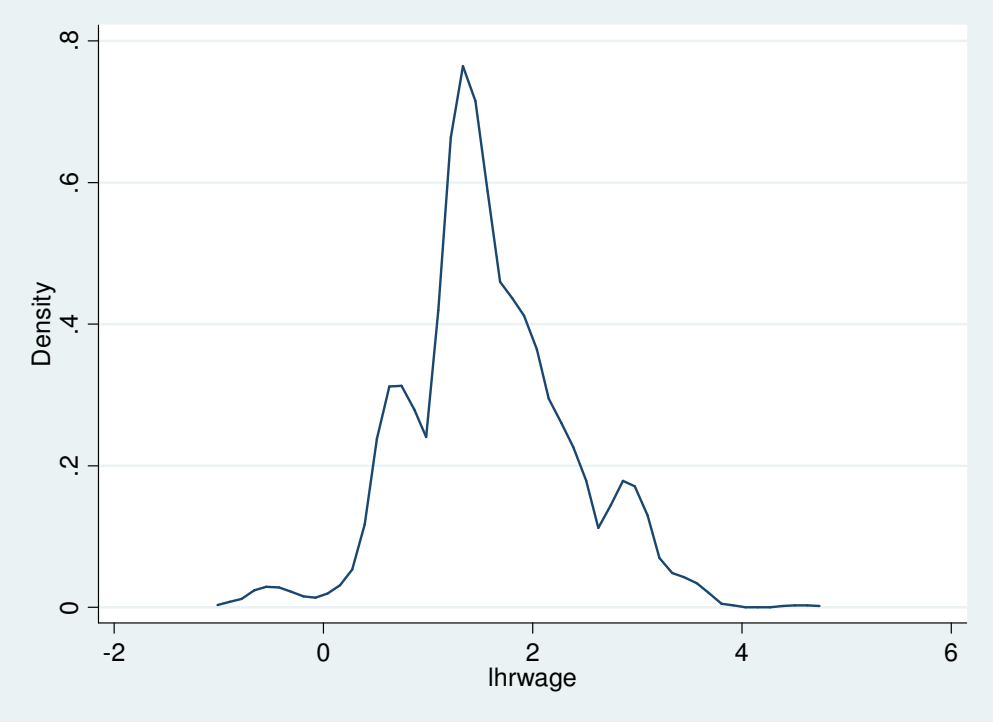
(c) The inverse Mills ratio is constructed using probit estimates from employment attachment equations reported in table A.6.1.

St. Lucia 1996

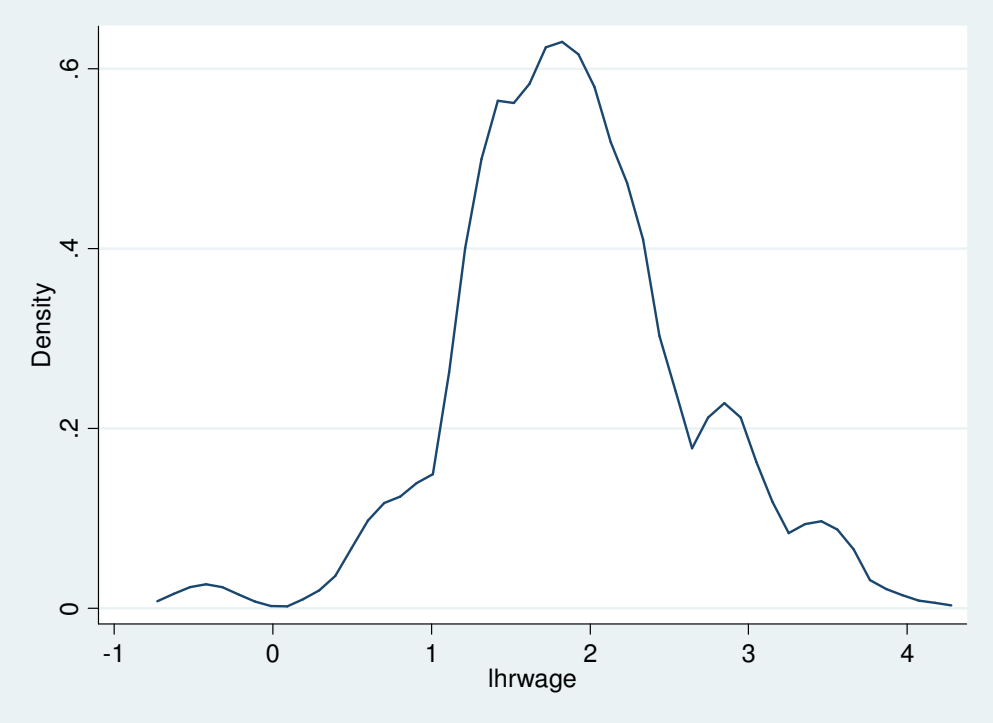
Graph A.3.7: St. Lucia ln(Hourly wage) employed sample - 1996



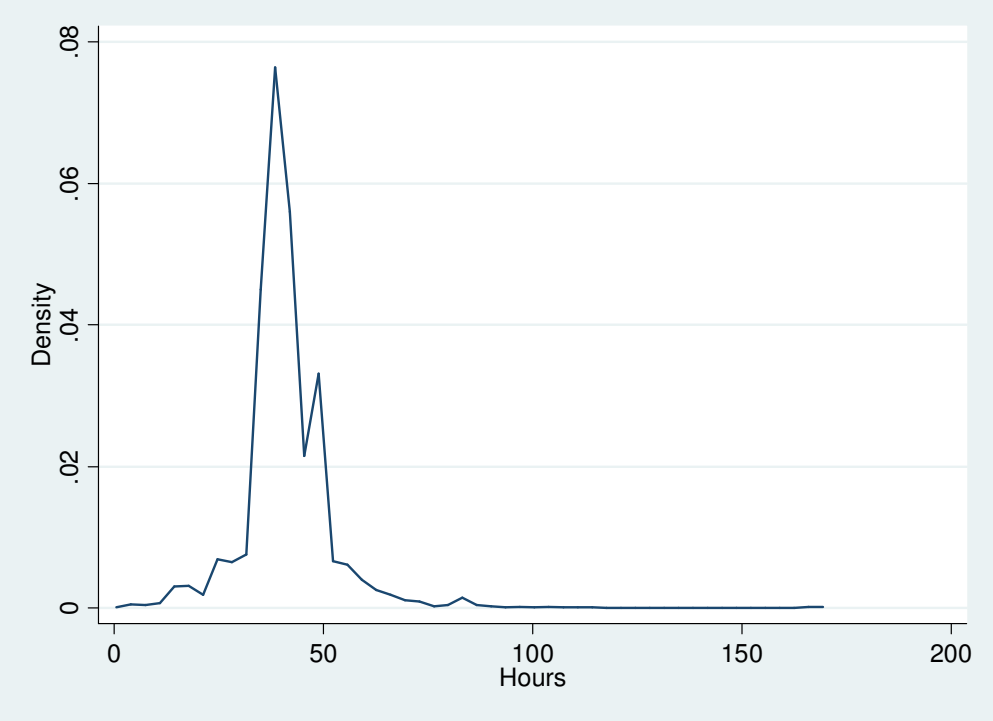
Graph A.3.8 St.Lucia ln(Hourly wage) employed female sample - 1996



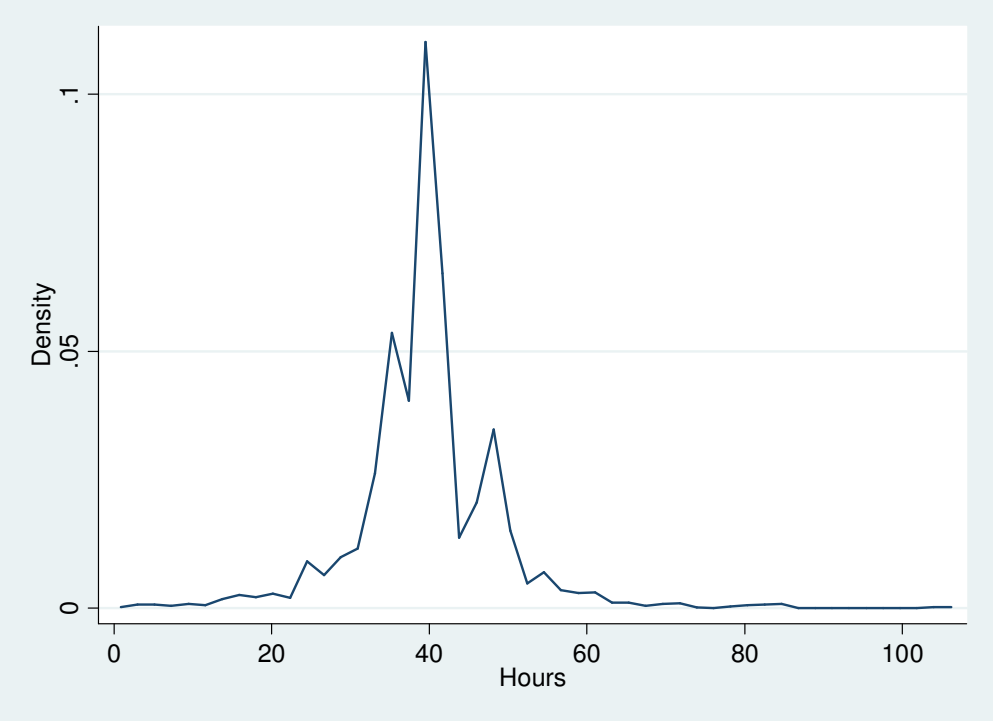
Graph A.3.9. St. Lucia ln(Hourly wage) employed male sample - 1996



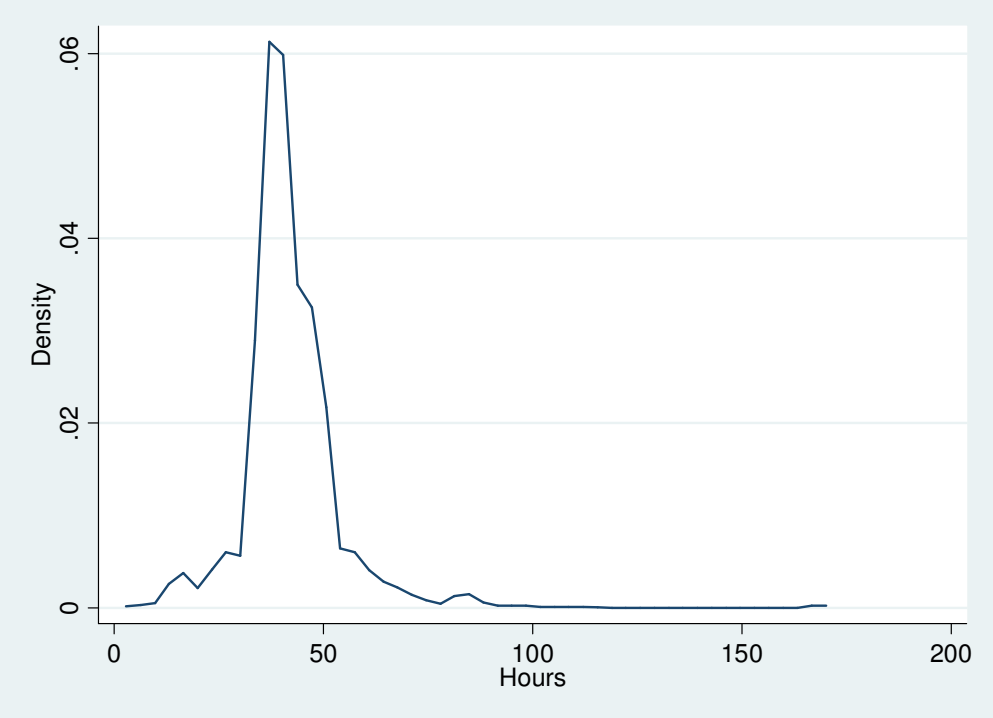
Graph A.3.10. St. Lucia hours employed sample - 1996



Graph A.3.11. St.Lucia hours employed female - 1996

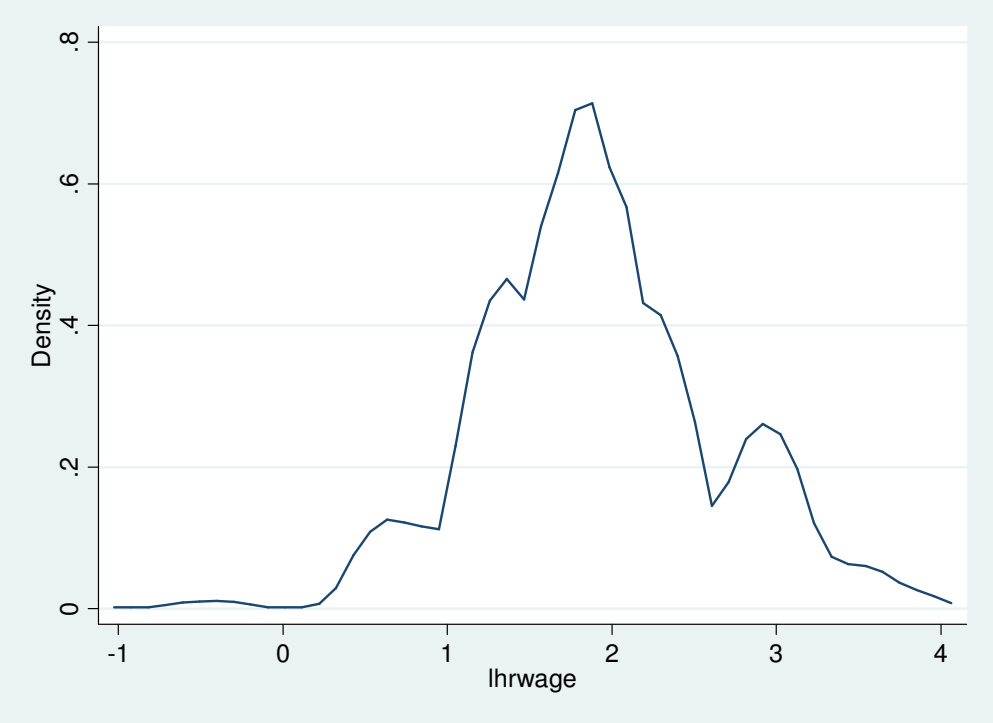


Graph A.3.12. St.Lucia hours employed male - 1996

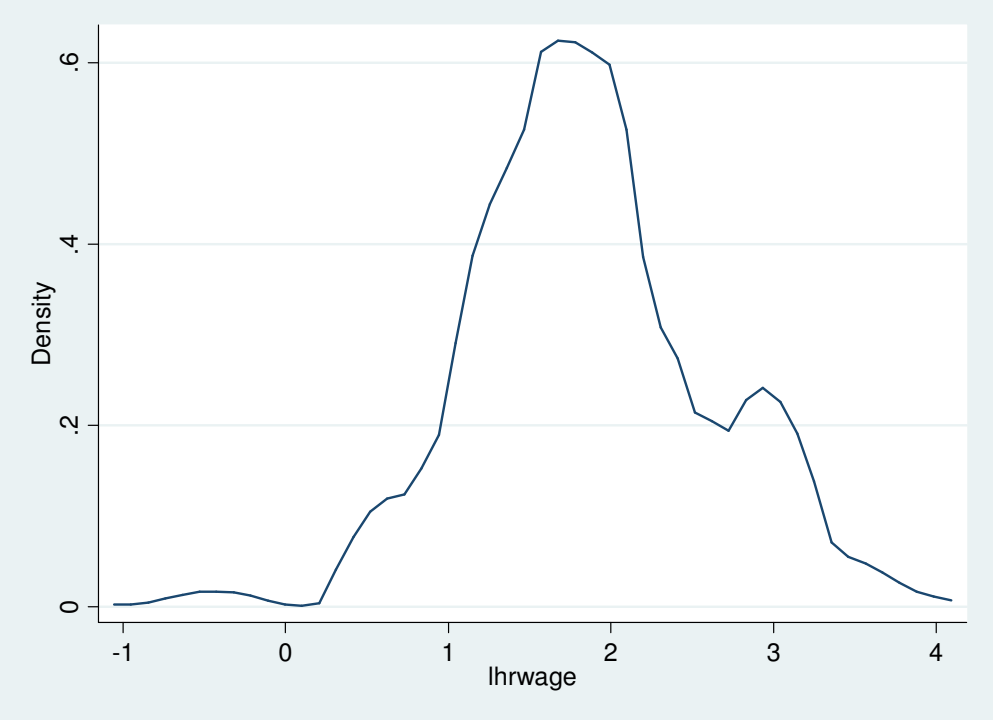


St. Lucia 2004

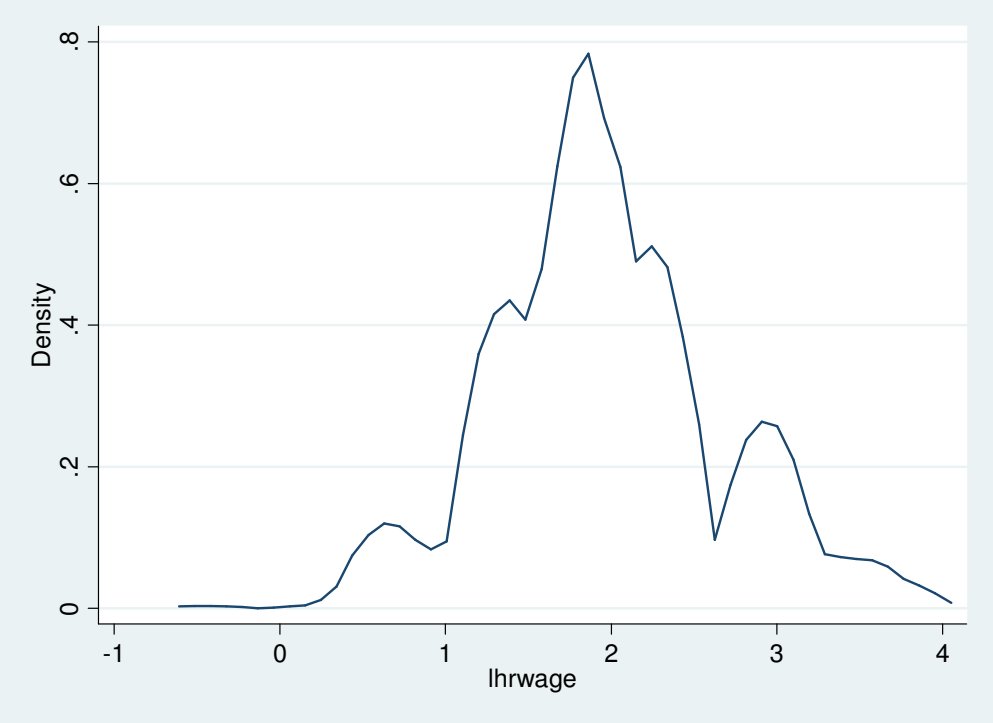
Graph A.3.13. St. Lucia ln(Hourly wage) employed - 2004



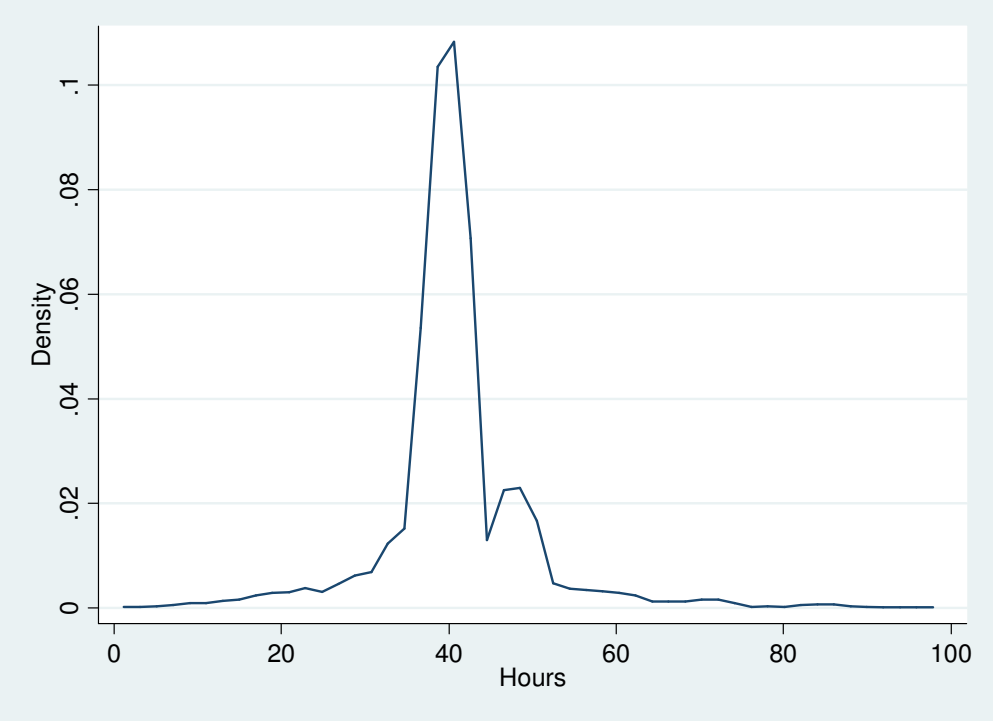
Graph A.3.14. St.Lucia ln(Hourly wage) employed female - 2004



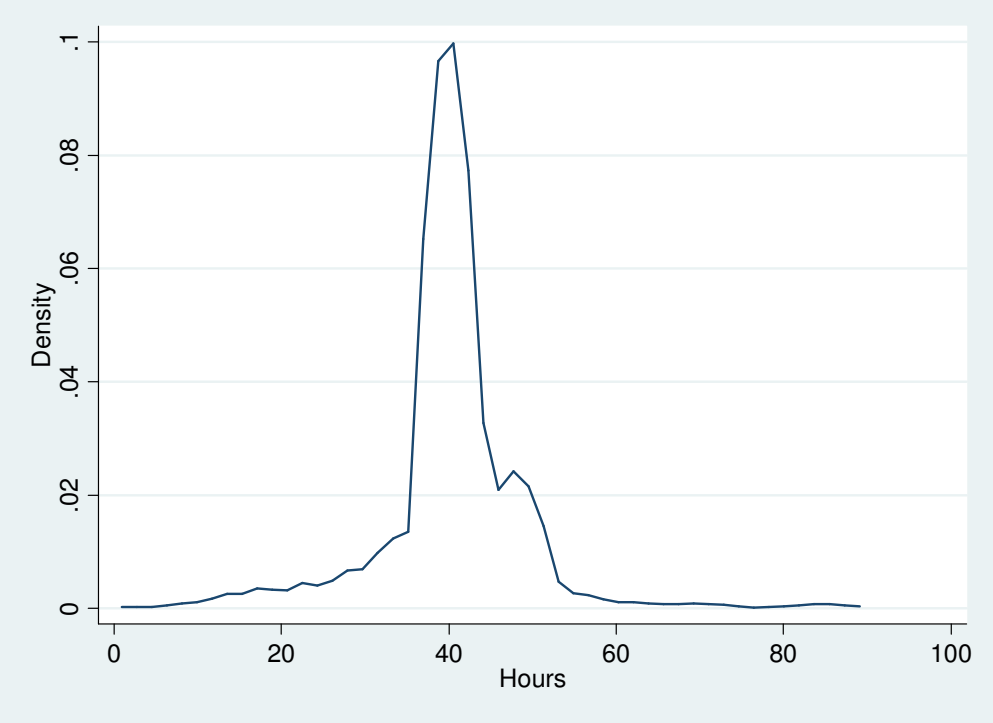
Graph A.3.15. St.Lucia ln(Hourly wage) employed male - 2004



Graph A.3.16. St.Lucia hours employed - 2004



Graph A.3.17. St.Lucia hours employed female sample - 2004



Graph A.3.18. St.Lucia hours employed male sample - 2004

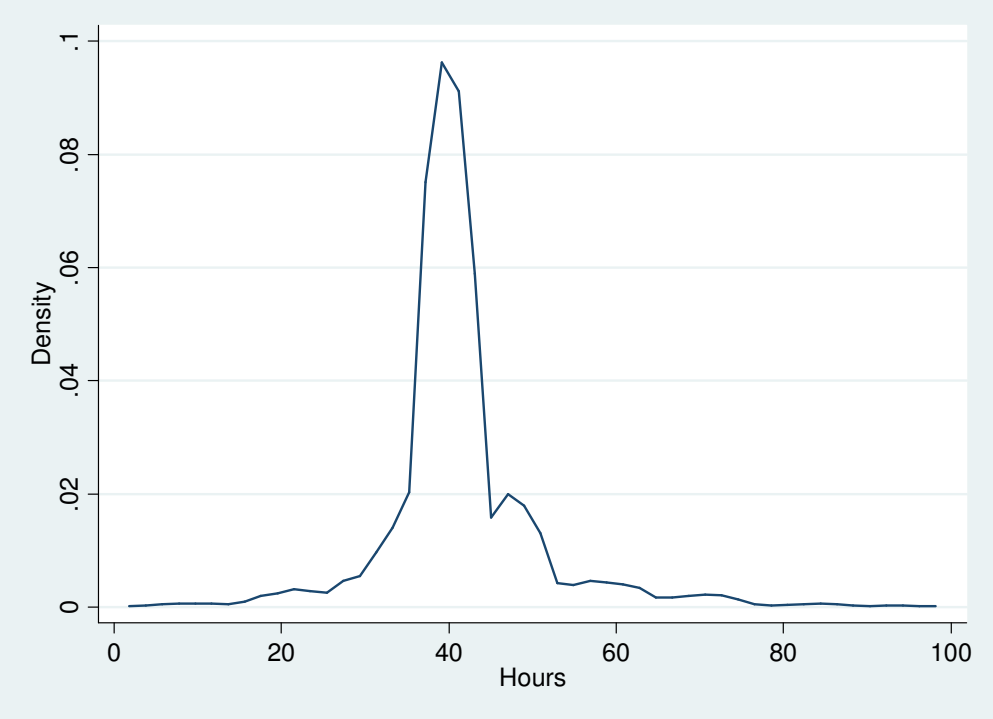


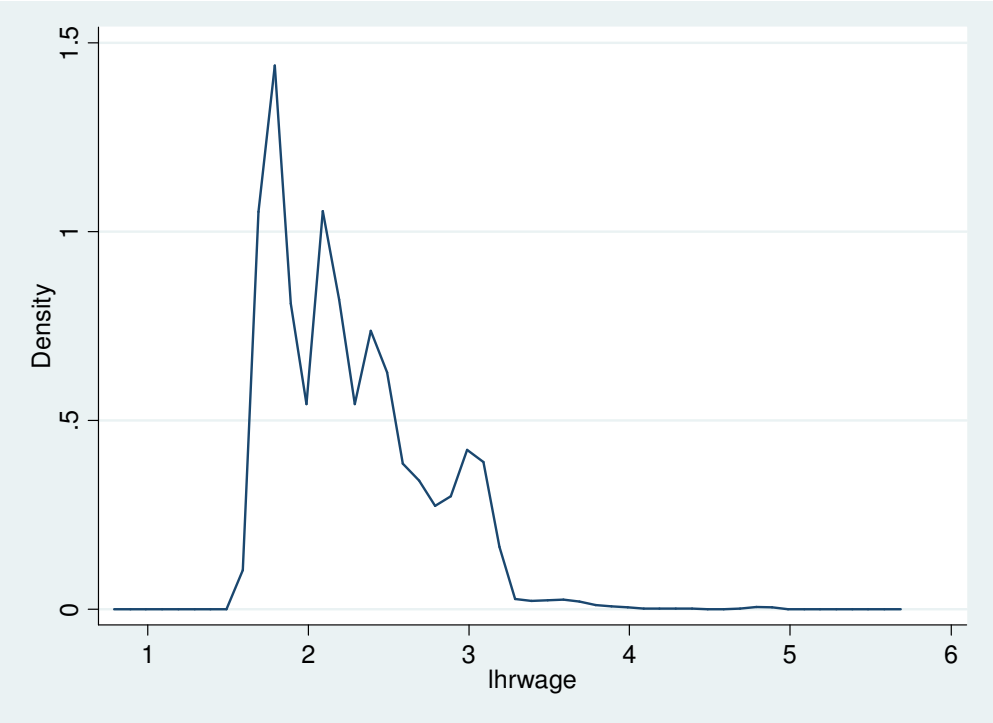
Table A.3.3. Barbados -Variable Description

Variable	Description
Age	Age measured in years.
Male	=1 if individual is male, =0 otherwise.
Primary§	=1 if individual has completed primary education, =0 otherwise.
Secondary	=1 if individual has completed secondary education, =0 otherwise.
Other Education	=1 if individual has completed other education programme, =0 otherwise.
Technical vocational	=1 if individual has completed technical vocational education, =0 otherwise.
University	=1 if individual has completed university, =0 otherwise.
Tenure_1§	=1 if individual has job tenure less than one year, =0 otherwise.
Tenure_2	=1 if individual has job tenure of 1 – 5 years, =0 otherwise.
Tenure_3	=1 if individual has job tenure of 6 – 10 years, =0 otherwise.
Tenure_4	=1 if individual has job tenure of 11 – 15 years, =0 otherwise.
Tenure_5	=1 if individual has job tenure of 16 - 20 years, =0 otherwise.
Tenure_6	=1 if individual has job tenure of 20 years or more, =0 otherwise.
Log(Hours)	Natural logarithm of actual hours worked.
Private Sector§	=1 if individual is a private sector employee, =0 otherwise.
Government	=1 if individual is a government employee, =0 otherwise.
Self-employed	=1 if individual is self-employed, =0 otherwise
Agriculture	=1 if industry is agriculture, fishing or forestry, =0 otherwise.
Manufacturing§	=1 if industry is manufacturing, =0 otherwise.
Utility	=1 if industry is utility, =0 otherwise.
Construction	=1 if industry is construction, =0 otherwise.
Retail	=1 if industry is retail trades, =0 otherwise.
Hotels	=1 if industry is hotels, =0 otherwise.
Transport	=1 if industry is transportation, =0 otherwise.
Finance	=1 if industry is financial services, =0 otherwise.
Public Administration	=1 if industry is public administration, =0 otherwise.
General Services	=1 if industry is general services, =0 otherwise.
Stratum1§	=1 if individual resides in this stratum, =0 otherwise.
Stratum2	=1 if individual resides in this stratum, =0 otherwise.
Stratum3	=1 if individual resides in this stratum, =0 otherwise.
Stratum4	=1 if individual resides in this stratum, =0 otherwise.
$\frac{\phi(\cdot)}{\Phi(\cdot)}$ (Selection Term)	The inverse Mills ratio (or selection correction) term where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the probability density and cumulative distribution function operators for the standard normal respectively.

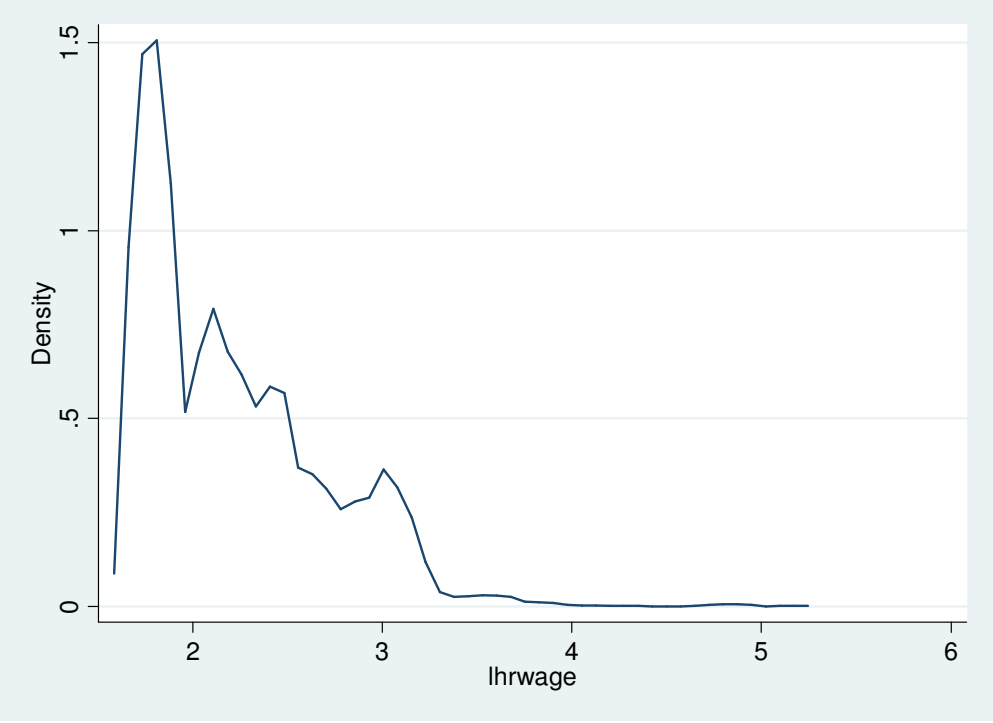
Notes:
(a) § denotes the base group in regression estimation.
(b) The inverse Mills ratio is constructed using probit estimates from employment attachment equations reported in table A.7.3.

Barbados 1999

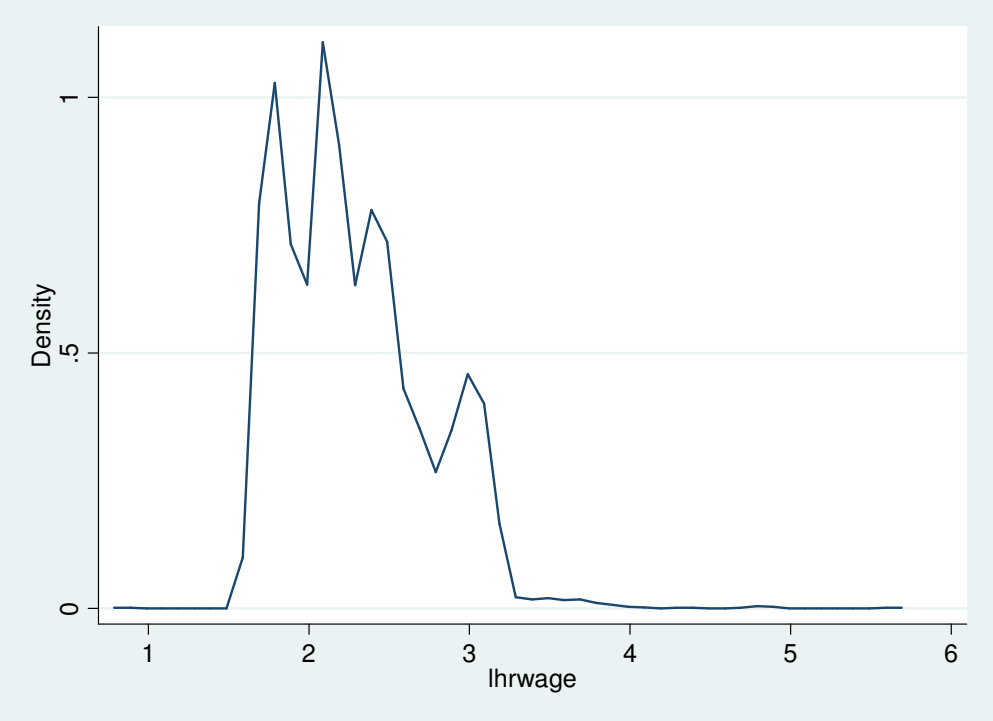
Graph A.3.19. Barbados ln(Hourly wage) employed - 1999



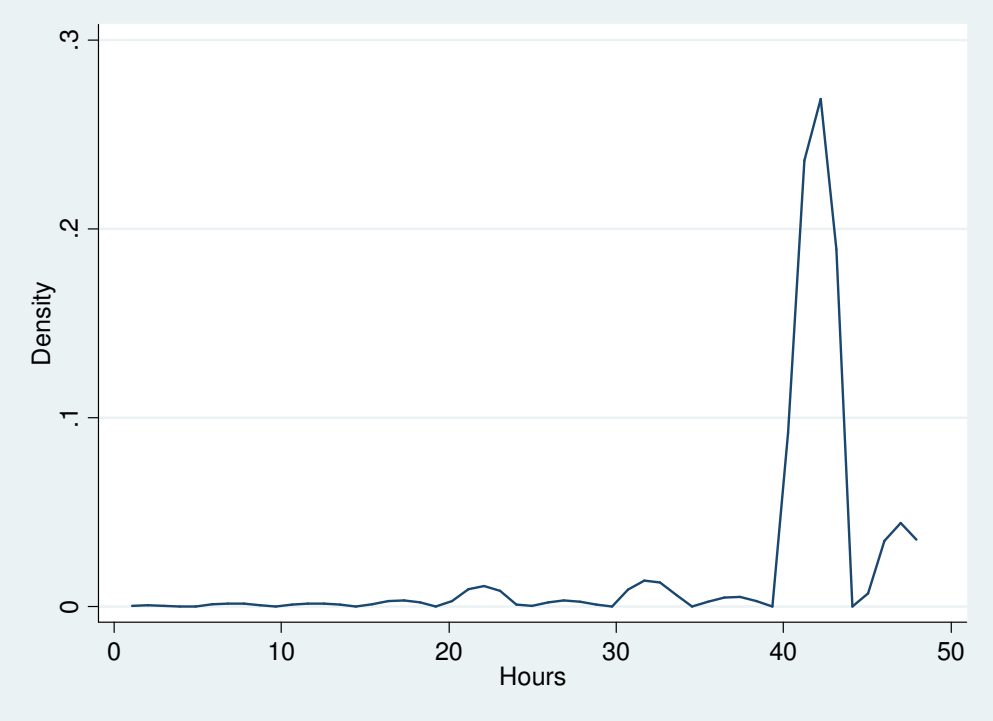
Graph A.3.20. Barbados ln(Hourly wage) employed female - 1999



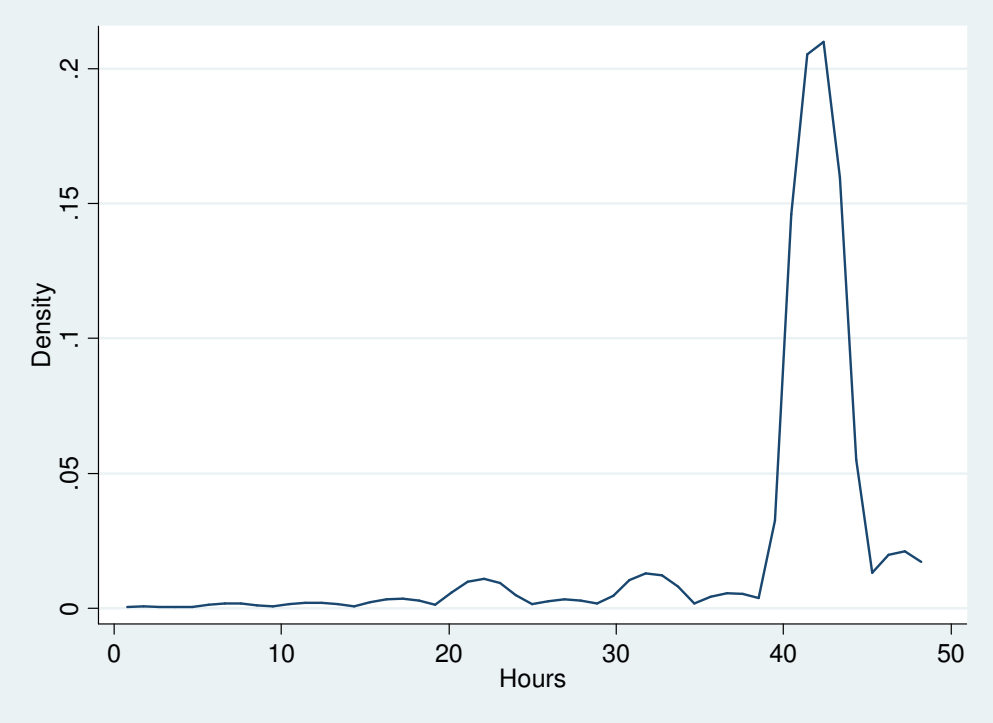
Graph A.3.21. Barbados ln(Hourly wage) employed male - 1999



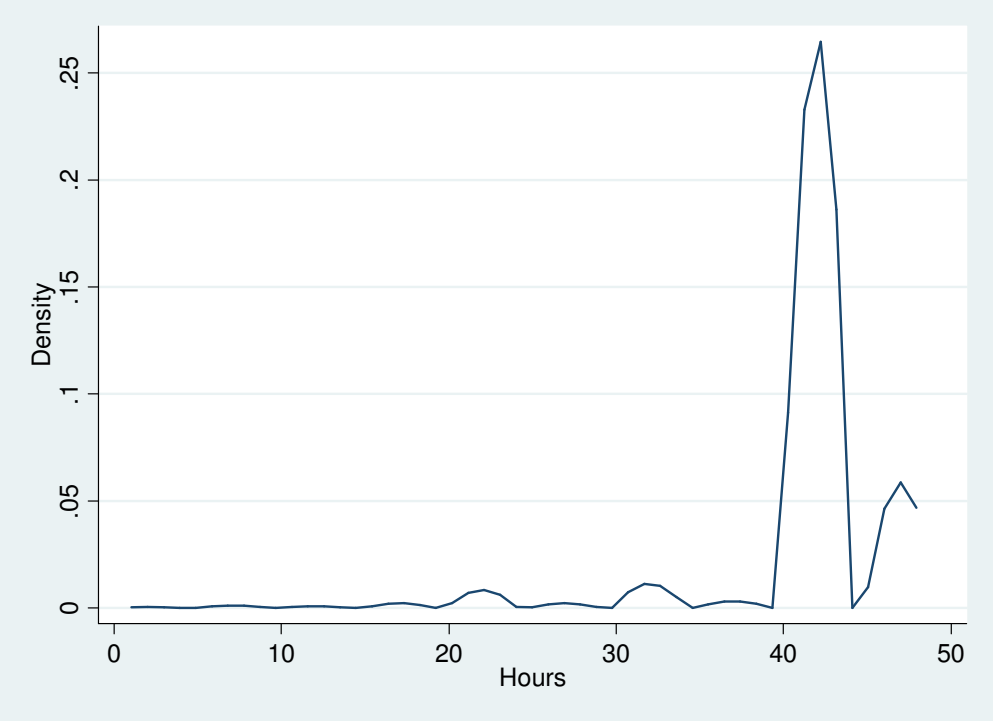
Graph A.3.22. Barbados hours employed sample - 1999



Graph A.3.23.Barbados hours employed female - 1999

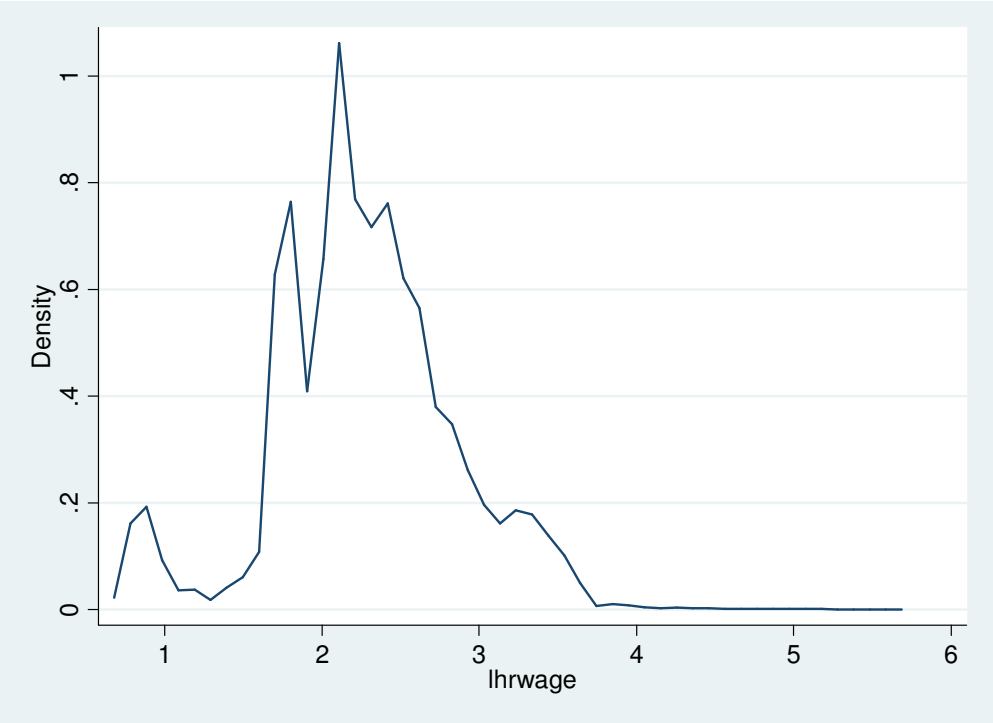


Graph A.3.24. Barbados hours employed male - 1999

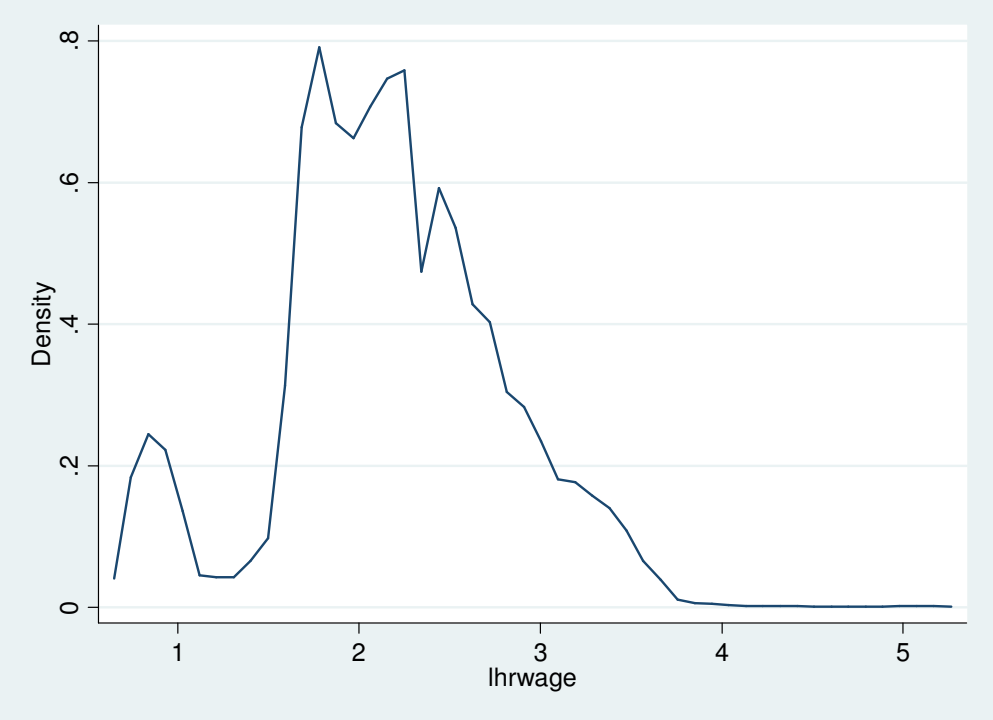


Barbados 2003

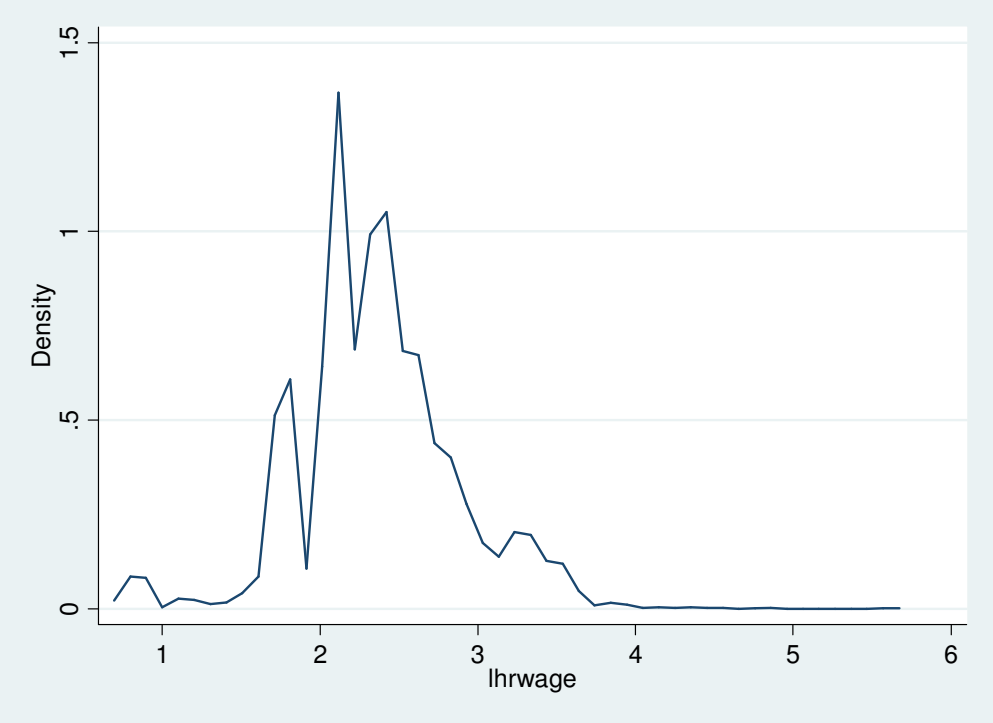
Graph A.3.25. Barbados ln(Hourly wage) employed sample - 2003



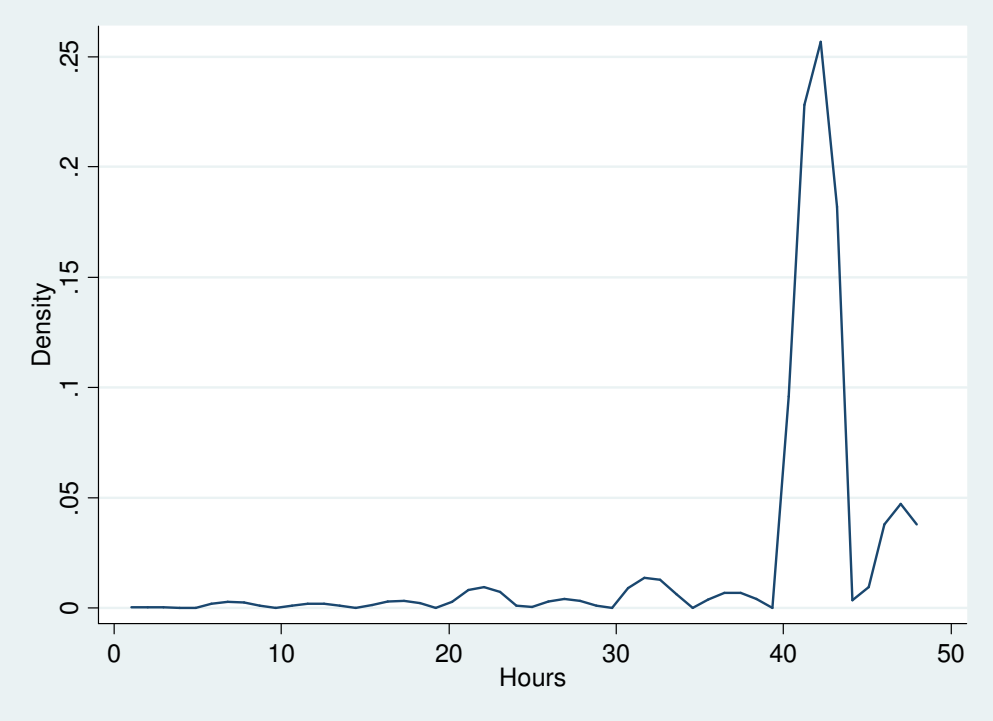
Graph A.3.26. Barbados ln(Hourly wage) employed female - 2003



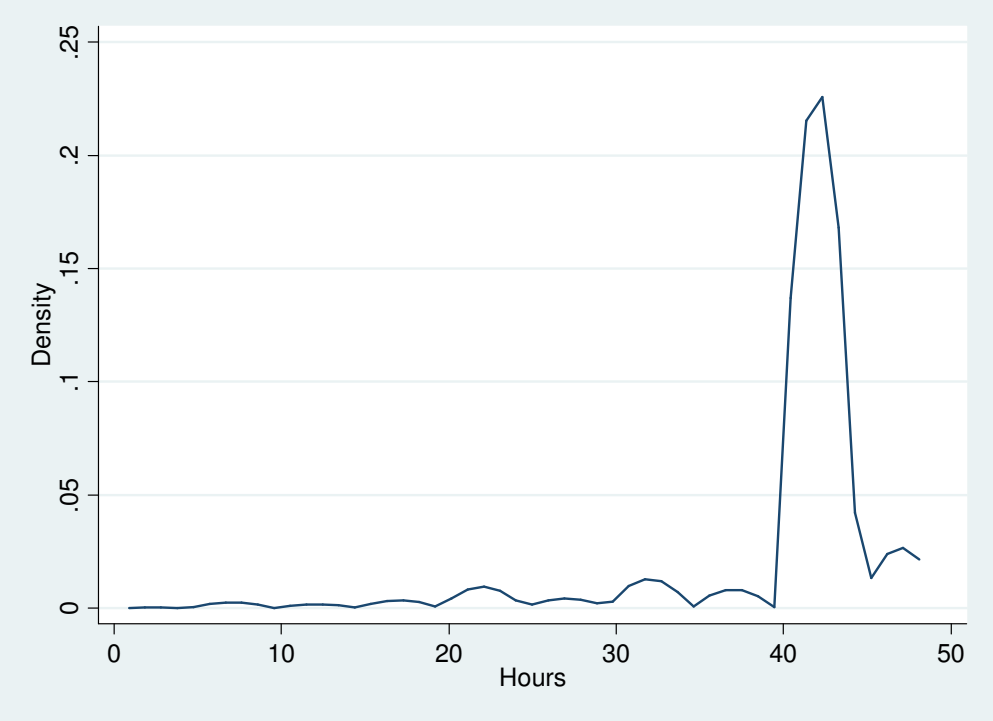
Graph A.3.27. Barbados ln(Hourly wage) employed male - 2003



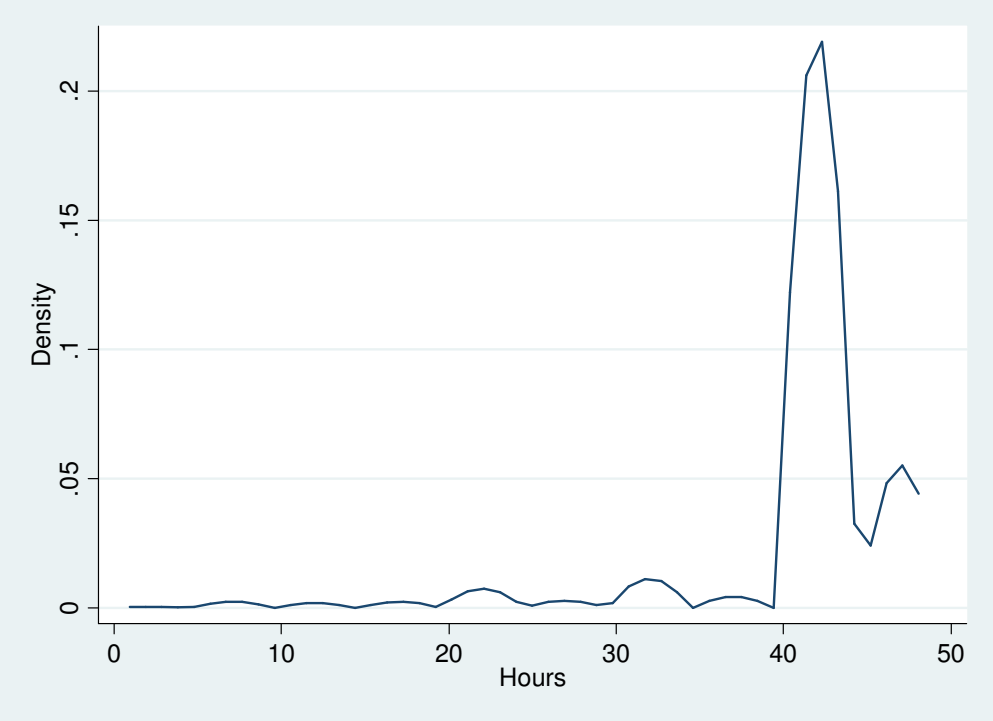
Graph A.3.28. Barbados hours employed - 2003



Graph A.3.29. Barbados hours employed female - 2003



Graph A.3.30. Barbados hours employed male - 2003



Chapter 4

Table A.4.1. Structure of National Education Systems in Selected Caribbean Countries

	Age (Years)															
Countries	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**
Antigua and Barbuda			P	P	P	P	P	P	P	S1	S1	S1	S2	S2		
Barbados	PS	PS	P	P	P	P	P	P	P	S	S	S	S	S	S	
Dominica	PS	PS	P	P	P	P	P	P	P	S	S	S	S	S		
Grenada	PS	PS	P	P	P	P	P	P	P	S	S	S	S	S		
Jamaica	PS	PS	P	P	P	P	P	P	S1	S1	S1	S2	S2	S2		
Montserrat	PS	PS	P	P	P	P	P	P	P	S	S	S	S	S		
St. Kitts and Nevis	PS	PS	P	P	P	P	P	P	P	S1	S1	S1	S1	S2	S2	
St. Vincent and the Grenadines	PS	PS	P	P	P	P	P	P	P	S1	S1	S1	S1	S1	S2	S2
St. Lucia			P	P	P	P	P	P	P	S1	S1	S1	S2	S2		
Trinidad and Tobago	PS	PS	P	P	P	P	P	P	P	S1	S1	S1	S2	S2		

Source: UNESCO
Notes: PS- Pre-Primary; P- Primary; S- Secondary; S1 Secondary First Cycle; S2- Secondary Second Cycle

Chapter 5

Table A.5.1. Dominica Offshore Sector Revenue

	1996	**1997**	**1998**	**1999**
Economic Citizenship	4,487,900	8,477,692	8,093,781	8,030,377
Offshore Banking	43,200	140,000	114,728	132,624
International Business Corporation	†	750,437	721,737	331,223
Internet Gaming	†	442,349	1,243,239	1,416,501
Exempt Trust	†	†	3,600	21,058
Exempt Insurance	†	†	5,869	21,612
Management Companies	†	†	5,869	10,958
Total	**4,531,100**	**9,810,478**	**10,188,823**	**9,964,353**

Source: Dominica Central Statistical Office

Table A.5.2. Composition of the Caribbean Offshore Financial Sector (2000-2001)

Jurisdictions	International Business Companies	Offshore Banks	Trust Companies	Offshore Insurance Companies	Mutual Funds	Gaming Companies	Foreign Sales Corporations	Offshore Banks with Onshore Affiliates
British Virgin Islands	314,158	†	†	395	2,013	†	†	†
Cayman Islands	49,456	450	25,000	502	2,298	190	†	51
The Bahamas	100,092	415	†	†	600	†	†	†
St. Kitts and Nevis	22,450	1	2,020	†	†	9	75	1
St. Vincent and the Grenadines	10,075	38	896	1	5	†	†	†
Antigua and Barbuda	8,000	22	6	†	†	77	†	1
Dominica	7,536	5	5	2	†	6	†	†
Barbados	3,399	45	†	239	†	†	2,857	†
Grenada	3,400	44	11	6	†	†	†	†
Anguilla	1,876	1	6	18	†	†	†	†

Source: Suss, Williams, Mendis (2005)

Table A.5.3. Tests for Gender Interactions in Earnings Equation

Variable(s)	Wald Test Values
Government ~ χ^2_1	0.0081 (0.9281)
Self-employed ~ χ^2_1	0.0652 (0.7985)
Age ~ χ^2_2	6.3950** (0.0409)
Educational Levels ~ χ^2_6	7.0254 (0.3185)
Industries ~ χ^2_{10}	29.0826*** (0.0012)
Districts ~ χ^2_8	10.3266 (0.2428)
Carib ~ χ^2_1	5.8603** (0.0155)
Tenure ~ χ^2_4	2.8288 (0.5869)
Inverse Mills Ratio (Selection Correction) Term ~ χ^2_1	7.3544*** (0.0067)
Overall Test for Gender Differences in Parameters (excluding gender dummy) ~ χ^2_{35}	82.07*** (0.000)
Overall Test for Gender Differences in Parameters (including gender dummy) ~ χ^2_{36}	99.590*** (0.000)

Notes:
(a) The fully interactive model adds the full set of gender interactive terms to augmented model (3) in table 5.2.
(b) The Wald tests are based on the use of the Huber (1967) variance-covariance matrix.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) The Wald test prob-values are reported in parentheses.

Table A.5.4. Probit Model for Employment in Dominica

Variables	Probit Coefficient
Constant	-1.6147***
	(0.2848)
HOH	0.3688***
	(0.1070)
Agedum_2	1.2168***
	(0.1524)
Agedum_3	1.2670***
	(0.1635)
Agedum_4	1.2985***
	(0.1750)
Agedum_5	0.8839***
	(0.1731)
Male	0.3169
	(0.4016)
Carib	0.4835*
	(0.2824)
Primary	0.0464
	(0.2065)
Secondary-Incomplete	0.2564
	(0.3366)
Secondary	0.6710***
	(0.2254)
Tertiary	1.2403***
	(0.2703)
Education other	1.6085**
	(0.6847)
University	1.3029***
	(0.4322)
Roseau City	0.3715**
	(0.1670)
St. John	0.1147
	(0.2113)
St. Joseph	0.1605
	(0.2064)
St. Paul	0.1657
	(0.1975)
St. Luke	-0.3730*
	(0.2284)
St. Patrick	-0.1537
	(0.1967)
St. David	0.4149**
	(0.2083)
St. Andrew	0.2238
	(0.1842)
Male×HOH	0.1466
	(0.1681)
Male×Agedum_2	0.1374
	(0.2128)
Male×Agedum_3	0.2822
	(0.2358)
Male×Agedum_4	0.1530
	(0.2569)
Male×Agedum_5	0.1553
	(0.2569)
Male×Carib	0.1981
	(0.4638)
Male & Education Interactions (5)	Yes
Male & District Interactions (8)	Yes
Sample Size	1920
Log-Likelihood Value	-1002.97
McFadden R^2	0.2271

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Chapter 6

Table A.6.1. Probit Model for Employment in St.Lucia

Variables	Probit Coefficient	
	1996	**2004**
Constant	-1.0093***	-1.6311***
	(0.1174)	(0.1699)
HOH	0.4325***	0.4302***
	(0.0692)	(0.0750)
Agedum_2	0.7443***	0.8944***
	(0.0879)	(0.1102)
Agedum_3	0.9306***	0.9926***
	(0.0925)	(0.1127)
Agedum_4	0.8339***	1.0891***
	(0.1117)	(0.1277)
Agedum_5	0.1549	0.3768***
	(0.1115)	(0.1318)
Male	0.4812***	0.2943
	(0.1789)	(0.2300)
Primary	0.1786**	0.3607***
	(0.0907)	(0.1340)
Secondary-Incomplete	-0.5767***	-0.0155
	(0.1318)	(0.1876)
Secondary	0.3803***	0.7042***
	(0.1093)	(0.1467)
Tertiary	0.5316***	1.2706***
	(0.1529)	(0.1704)
Education Other	-0.6313*	0.2361
	(0.3778)	(0.3167)
University	0.5679**	1.4924***
	(0.2350)	(0.2230)
Castries City	-0.1053	0.0279
	(0.1148)	(0.1246)
Anse LaRaye	-0.1636	-0.2479
	(0.1363)	(0.1620)
Soufriere	0.2553*	-0.0585
	(0.1483)	(0.1325)
Choiseul	0.1517	-0.3816**
	(0.1403)	(0.1807)
Labourie	-0.2782**	-0.3397**
	(0.1373)	(0.1580)
Vieux Fort	-0.0360	-0.5127***
	(0.1130)	(0.1323)
Micoud	-0.3432***	0.0195
	(0.1042)	(0.1093)
Dennery	0.6362***	0.0494
	(0.1049)	(0.1342)
Gros Islet	-0.0326	-0.2096*
	(0.1015)	(0.1156)
Male×HOH	0.3084***	-0.0350
	(0.1123)	(0.1181)
Male×Agedum_2	0.1719	0.4256***
	(0.1312)	(0.1577)
Male×Agedum_3	-0.0537	0.4553***
	(0.1493)	(0.1711)
Male×Agedum_4	0.0521	0.3116*
	(0.1790)	(0.1899)
Male×Agedum_5	0.0359	0.5221***
	(0.1730)	(0.1967)
Male & Education Interactions (6)	Yes	Yes
Male & District Interactions (9)	Yes	Yes
Seasonality Controls	Yes	Yes
Sample Size	3993	3345
Log-Likelihood Value	-2196.483	-1800.759
McFadden R^2	0.2050	0.2030

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Table A.6.2. Labour Force Activity Rates

Labour Market Indicators (percent)	1996			2004		
	All	Male	Female	All	Male	Female
Labour Force Participation Rate [Labour Force/Total Population]	71.0	80.0	63.0	77.0	82.0	73.0
Unemployment Rate [Unemployed/Labour Force]	15.0	11.0	19.0	25.0	20.0	31.0
Employment Rate [Employed /Labour Force]	85.0	89.0	81.0	75.0	80.0	69.0

Source: Authors' calculations based on data from Labour Force Surveys 1996 and 2004 for those aged 15-64 years.

Table A.6.3. Tests for Gender Interactions in Earnings Equation

Variable(s)	Wald Test Values	
	1996	2004
Government ~ χ^2_1	0.3208 (0.5711)	0.0003 (0.9856)
Self-employed ~ χ^2_1	0.4634 (0.4960)	2.1329 (0.1442)
Age ~ χ^2_2	0.0789 (0.9613)	1.7997 (0.4066)
Educational Levels ~ χ^2_6	7.2042 (0.3024)	6.2809 (0.3925)
Industries ~ χ^2_{10}	13.5519 (0.1944)	19.9904** (0.0293)
Districts ~ χ^2_9	25.4182*** (0.0025)	14.6582 (0.1008)
Tenure ~ χ^2_4	4.7308 (0.3161)	4.4661 (0.3466)
Inverse Mills Ratio Term ~ χ^2_1	0.0033 (0.9545)	2.7989* (0.0943)
Seasonal Controls ~ χ^2_2 / χ^2_4	1.8178 (0.1776)	1.63251 (0.6520)

Notes:
(a) The fully interactive model adds the full set of gender interactive terms to the augmented model.
(b) Wald tests are based on use of the adjusted variance-covariance matrix.
(c) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.
(d) The Wald test prob-values are reported in parentheses.
(e) The seasonal controls ~ χ^2_k takes a value of k=2 in 1996 and in k=4 in 2004.

Chapter 7 – Barbados

Table A.7.1. Labour Force Activity Rates for Barbados

Labour Market Indicators (percent)	1999			2003		
	All	Male	Female	All	Male	Female
Labour Force Participation Rate [Labour Force/Total Population]	79.7	85.8	74.2	80.2	84.7	76.0
Unemployment Rate [Unemployed/Labour Force]	10.5	7.9	13.3	11.2	9.7	12.8
Unemployment Share (Youth aged 15-24 years)	36.8	40.9	34.3	34	38	31
Unemployed Youth/Unemployed						
Employment Rate [Employed /Labour Force]	89.5	92.1	84.2	88.8	90.3	87.2

Source: Authors' calculations based on data from Barbados Continuous Labour Force Sample Surveys 1999 and 2003 for those aged 15-64 years.

Table A.7.2. Tests for Gender Interactions in Earnings Equation

Variable(s)	Wald Test Values	
	1999	2003
Government ~ χ^2_1	4.7311**	13.0179***
	(0.0296)	(0.0003)
Self-employed ~ χ^2_1	0.2533	10.5534***
	(0.6148)	(0.0012)
Age ~ χ^2_2	1.8308	17.2003***
	(0.4004)	(0.0002)
Educational Levels ~ χ^2_4	27.5455***	21.7042***
	(0.0000)	(0.0002)
Industries ~ χ^2_9	25.8534***	56.8668***
	(0.0022)	(0.0000)
Stratum ~ χ^2_3	12.2846***	3.01283
	(0.0065)	(0.3897)
Tenure ~ χ^2_5	2.9527	2.40298
	(0.7073)	(0.791031)
Inverse Mills Ratio (Selection Correction) Term ~ χ^2_1	14.4864***	20.2313***
	(0.0001)	(0.0000)
Overall Test for Gender Differences in Parameters (excluding gender dummy) ~ χ^2_{27}	125.5830***	160.6430***
	(0.0000)	(0.0000)
Overall Test for Gender Differences in Parameters (including gender dummy) ~ χ^2_{28}	231.528***	495.5170***
	(0.0000)	(0.0000)

Notes:

(a) The Wald tests are based on the use of the Huber (1967) variance-covariance matrix. ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests. The Wald test prob-values are reported in parentheses.

Table A.7.3. Probit Model for Employment in Barbados

Variables	Probit Coefficient 1999	Probit Coefficient 2003
Constant	-0.2857***	-0.0451
	(0.1116)	(0.1112)
HOH	0.1088*	0.1628***
	(0.0618)	(0.0577)
Agedum_2	0.4167***	0.4858***
	(0.0820)	(0.0836)
Agedum_3	0.7526***	0.7661***
	(0.0845)	(0.0830)
Agedum_4	0.8356***	1.0132***
	(0.0960)	(0.0917)
Agedum_5	0.9817***	1.0544***
	(0.1183)	(0.1040)
Male	0.2351	0.2022
	(0.1536)	(0.1516)
Secondary	0.0665	0.1462*
	(0.0822)	(0.0817)
Technical vocational	0.5079**	0.1591
	(0.2399)	(0.1486)
Education other	0.1974	0.4520
	(0.4461)	(0.4052)
University	0.6360***	0.6145***
	(0.1140)	(0.0995)
Stratum2	0.0439	0.1430**
	(0.0646)	(0.0597)
Stratum3	0.0243	0.2082***
	(0.0719)	(0.0673)
Stratum4	0.0364	0.0787
	(0.0723)	(0.0718)
Male×HOH	0.1161	0.1584*
	(0.0941)	(0.0848)
Male×Agedum_2	0.1667	-0.0606
	(0.1182)	(0.1164)
Male×Agedum_3	-0.0558	0.0336
	(0.1235)	(0.1209)
Male×Agedum_4	-0.0036	-0.1150
	(0.1454)	(0.1349)
Male×Agedum_5	-0.2048	-0.2204
	(0.1700)	(0.1473)
Male & Education Interactions (4)	Yes	Yes
Male & Stratum Interactions (3)	Yes	Yes
Sample Size	8410	9740
Log-Likelihood Value	-2705.24	-3207.29
McFadden R^2	0.0763	0.0862

Notes:
(a) Standard errors based on Huber (1967) are reported in parentheses.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Chapter 8: Comparative Analysis

Table A.8.1. Unemployment Rates for Selected Caribbean Countries

	Year	Male	Female	Overall	Female-male percentage
Anguilla	2002	6.3	9.5	†	0.51
Antigua and Barbuda	1991	6.4	5.6	†	-0.13
Bahamas	2003	5.9	9.6	†	0.63
Barbados	2002	8.7	12.1	10.3	0.39
Belize	2004	8.3	17.4	11.6	1.10
Dominica	1997	19.6	27.2	†	0.39
Grenada	1998	10.5	21.2	†	1.02
Guyana	1992	8.4	18.1	†	1.15
Saint Lucia	2003	17.2	28.1	22.3	0.63
St. Vincent and Grenadines	1991	18.4	22.1	†	0.20
Trinidad and Tobago	2004	8.0	12.1	10.5	0.51

Source: ILO 2003

Table A.8.2. Composition of Public Sector in Selected Eastern Caribbean Countries – 2005

	Government Employment	Government Wages		
Country	(Percent of Labour Force)	(Percent of GDP)	(Percent of Current Revenue)	(Percent of Total Expenditure)
Barbados 1/	21	10	31	29
Dominica	13	13	40	33
St. Lucia 2/	20	10	39	31
Antigua and Barbuda	33	11	51	37
Grenada 2/	10	11	40	25
St. Kitts and Nevis 2/	22	14	38	32
St. Vincent and the Grenadines	11	14	47	38

Source: World Bank (2005b)
Notes:
(a) 1/ employment data as of 2004
(b) 2/ employment data as of 2002
(c) Public sector refers to central government

Table A.8.3. Average Years of Schooling in Selected Caribbean Countries

	1980	2000
Barbados	6.8	8.7
Haiti	1.9	2.8
Jamaica	4.1	5.3
Trinidad and Tobago	7.3	7.8
Guyana	5.2	6.3
Caribbean (average)	4.8	6.0
Latin America (average)	4.9	6.3
USA	11.9	12.0
World (average)	5.1	6.5

Source: World Bank 2005b.

Chapter 9: Alternative Estimation Procedures

Table A.9.1. Annualized Rates of Return to Educational Qualifications for IRM with Age Variable – Pooled Sample

	Barbados		Dominica	St. Lucia	
	1999	**2003**	**1999**	**1996**	**2004**
Primary	†	†	0.0253*	0.0121*	0.0321***
			(0.0138)	(0.0063)	(0.0091)
Secondary	0.0244***	0.0265***	0.0985***	0.0885***	0.0632***
	(0.0027)	(0.0025)	(0.0103)	(0.0073)	(0.0080)
Tertiary	†	†	0.1321***	0.2216***	0.1906***
			(0.0345)	(0.0349)	(0.0280)
University	0.1374***	0.1924***	0.1743***	0.2752***	0.2339***
	(0.0049)	(0.0044)	(0.0386)	(0.0239)	(0.0268)

Notes:
(a) † indicates not applicable.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Table A.9.2. Annualized Rates of Return to Educational Qualifications by Gender for IRM with Age Variable – St. Lucia and Barbados

Qualifications	**St. Lucia**				**Barbados**			
	1996		**2004**		**1999**		**2003**	
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	**Male**	**Female**
Primary	0.0081	0.0238**	0.0405***	0.0145	†	†	†	†
	(0.0081)	(0.0100)	(0.0105)	(0.0186)				
Secondary	0.0686***	0.1077***	0.0599***	0.0773***	0.0173***	0.0403***	0.0216***	0.0409***
	(0.0066)	(0.0099)	(0.0116)	(0.0112)	(0.0035)	(0.0036)	(0.0030)	(0.0046)
Tertiary	0.2080***	0.2332***	0.0931**	0.2753***	†	†	†	†
	(0.0326)	(0.0407)	(0.0418)	(0.0382)				
University	0.2596***	0.3274***	0.2341***	0.2625***	0.1236***	0.1573***	0.1749***	0.2155***
	(0.0414)	(0.0344)	(0.0388)	(0.0400)	(0.0070)	(0.0068)	(0.0067)	(0.0060)

Notes:
(a) † indicates not applicable to estimation.
(b) ***, ** and * denote statistical significance at the 0.01, 0.05 and 0.10 level respectively using two-tailed tests.

Table A.9.3. Public Sector Pay Premium and Gender Pay Gap: Re-estimated IRM and OLS

	Dominica	**St.Lucia**		**Barbados**	
	1999	**1996**	**2004**	**1999**	**2003**
Public Sector Pay Premium					
Re-estimated IRM *Ceteris paribus* (or adjusted) public sector pay premium 1/	0.1550**	0.1181*	0.0746	0.0731***	0.2120***
	(0.0660)	(0.0649)	(0.0676)	(0.0244)	(0.0376)
OLS *Ceteris paribus* (or adjusted) public sector pay premium 1/	0.1264**	0.1068*	0.0507	0.0664***	0.2709***
	(0.0689)	(0.0651)	(0.0705)	(0.0222)	(0.0446)
Gender Pay Gap					
Re-estimated IRM *Ceteris Paribus* (or adjusted) gender pay gap 2/	0.1573***	0.3738***	0.1744***	0.0523***	0.1221***
	(0.0511)	(0.0332)	(0.0352)	(0.0122)	(0.0106)
OLS *Ceteris Paribus* (or adjusted) gender pay gap 2/	0.2293***	0.4238***	0.2132***	0.1196***	0.1906***
	(0.0529)	(0.0343)	(0.0379)	(0.0108)	(0.0120)

Notes:
(a) 1/ reports the *ceteris paribus* public sector pay premium from the augmented specification.
(b) 2/ reports the *ceteris paribus* gender pay gap from the basic Mincerian specification.
(c) The public sector pay premium and the gender pay gap as reported in the table are the coefficients in log-points.